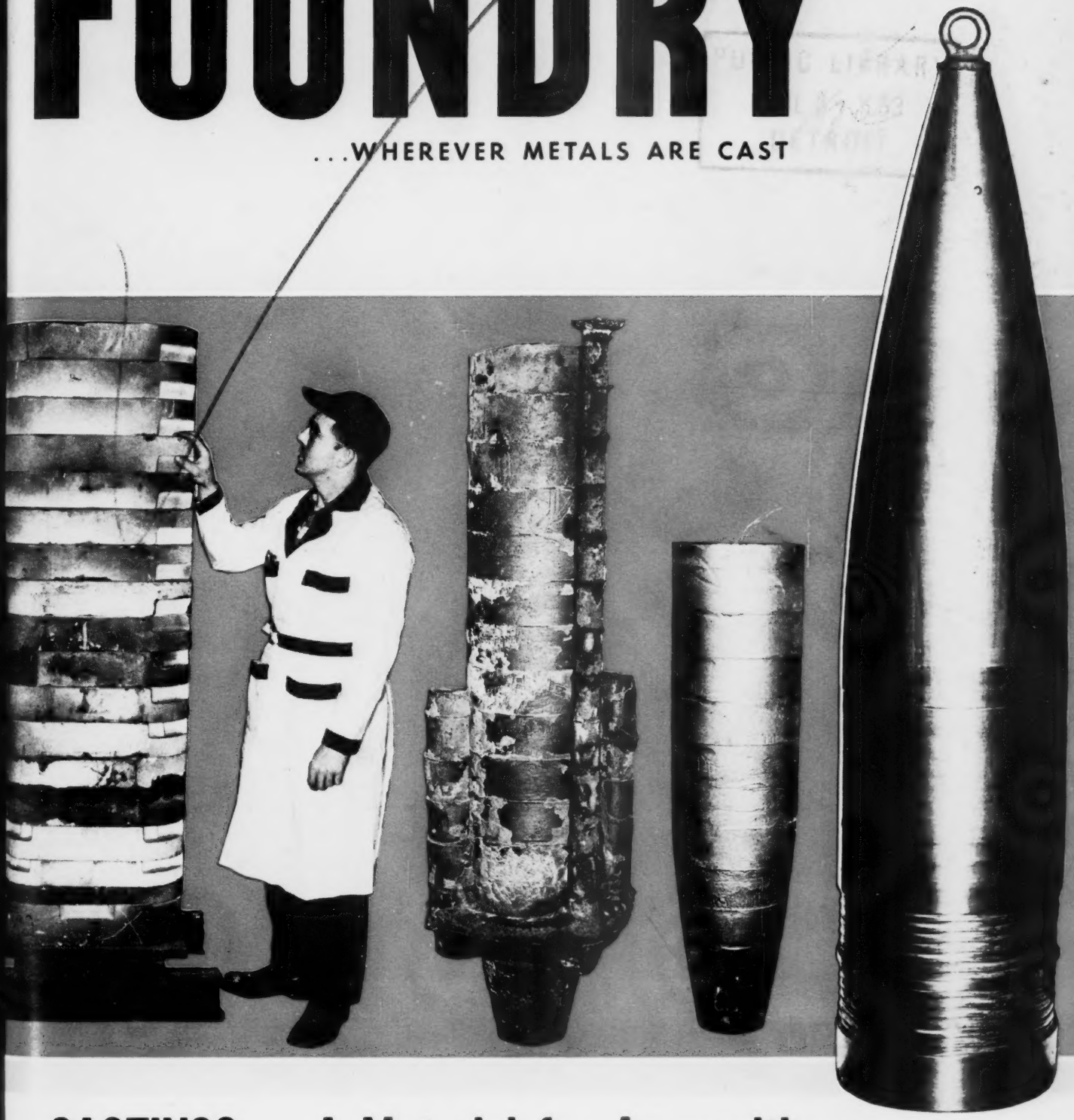
JULY 1953

FOUNDRY

...WHEREVER METALS ARE CAST



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VIBRATING SOLIDIFYING CASTINGS
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LOW-FREQUENCY INDUCTION MELTING
New in Malleable Practice, p. 108

"Purite keeps production uniform..."

"For fluxing and desulphurization, we depend on Purite. It helps us produce iron of consistent high quality and keeps casting losses at a minimum."

For 30 years, Purite has been the choice of leading foundries everywhere. Here's why:

1. Purite produces a higher percentage of finished castings per ton of metal poured.
2. Purite gives 100% fluxing action in the cupola—100% desulphurizing action in the ladle.
3. Purite is time-tested and proved for unsurpassed desulphurizing uniformity.
4. Purite is 100% pure fused soda ash—you do not pay for inert materials.
5. Purite gets to all the iron quicker.
6. Purite comes in uniform 2-lb. pigs and 2-oz. tablets—no weighing or measuring required.
7. Purite can be shipped in bulk carloads at substantial savings over bag shipments—is easily stored without deterioration.

Purite, the scientific flux for better melting and cleaner iron, is sold by leading foundry supply houses in the United States and Canada.

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MATHIESON CHEMICAL CORPORATION

Mathieson Industrial Chemicals Division

Baltimore 3, Maryland

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Reduce Your Shakeout Costs

You get quick, low-cost installation. Allis-Chalmers distinctive free-floating design means a simpler, less costly foundation on new as well as replacement installations.

You enjoy low maintenance, thanks to the simple two-bearing mechanism. Allis-Chalmers shakeouts have far fewer parts.

You are assured of long service through rugged, one-piece body construction. Users report units in excellent condition even after many years of continuous operation.

A-4072

"FOUNDROMATIC" SHAKEOUTS

Foundry-proved Allis-Chalmers shakeouts are available in single or multiple units for every foundry need. For more information, call your nearby A-C district office or write Allis-Chalmers, Milwaukee 1, Wisconsin.

Only FOUNDROMATIC Shakeouts Give You All These Important Features

Plenty of vibration for largest loads within rating.

No shaft has ever broken on a *Foundromatic* shakeout.

All bearings rated to last a minimum of 5000 hours.

Only one dust seal on the mechanism.

Body weldment is stress-relieved for maximum resistance to shock impact loads.

Long-life flat deck of sufficiently thick plate to stand up under heaviest duty.

Effective belt tension assured by specially designed pivoted motor base.

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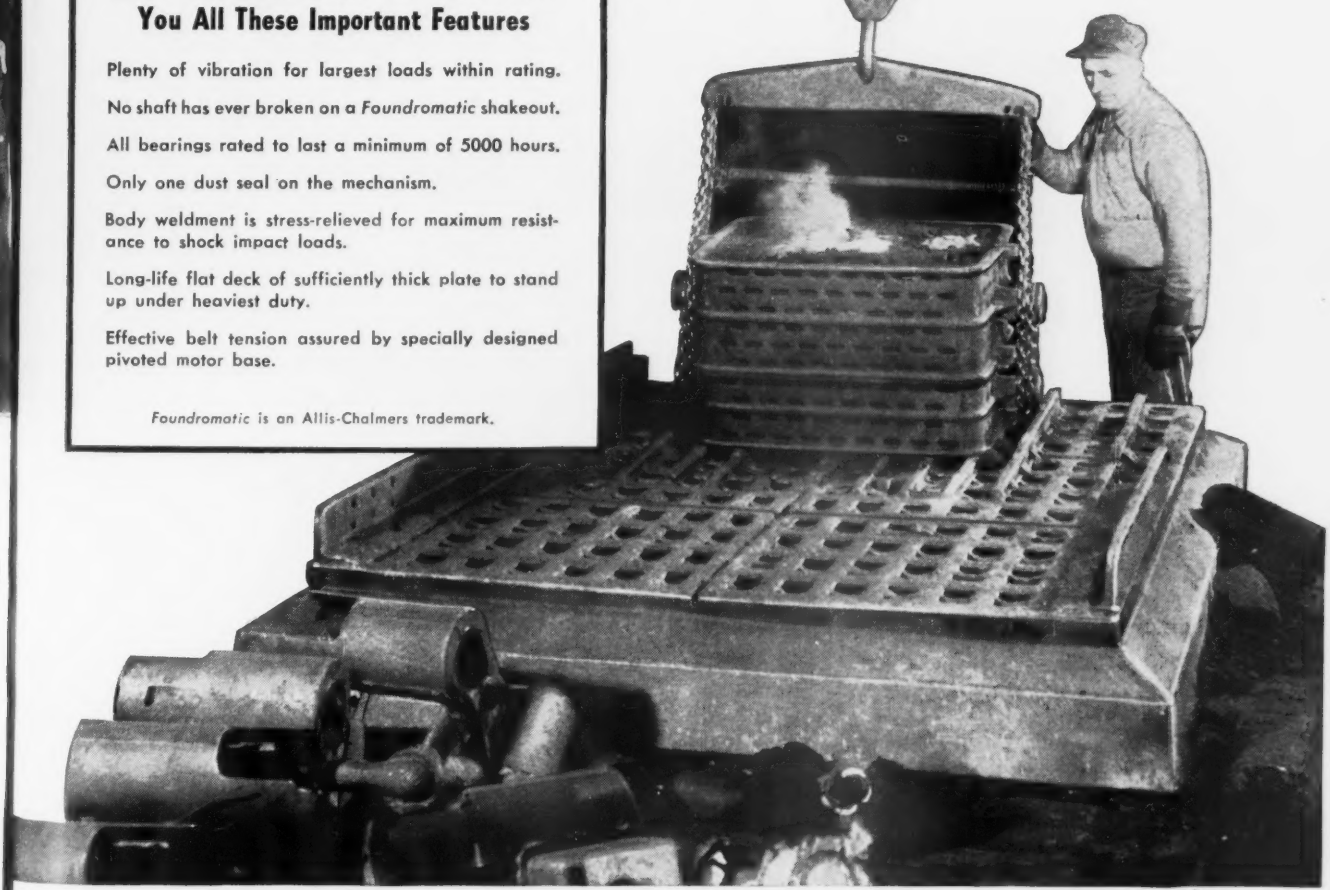

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Foundry Equipment for Bigger Output—Better Working Conditions!

Vibrating Screens

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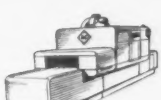
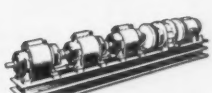
Motors-Drives Control



Foundromatic Core Dryer

Induction Heating & Melting



Regulex Arc Furnace Control

Easy does it!
sand preparation and control
can be easy — if you use
CROWN HILL SEACOAL,
FEDERAL GREEN BOND and
FEDERAL SAND STABILIZER

Honestly, sand preparation and control needn't be as complicated as some people make out it is. True, you've got to be sure carbon content is right—that green and dry strengths are high enough—that flowability is just as required. But this can be accomplished easily and economically through the use of three highly efficient and inexpensive sand additives. By using these materials in varying amounts, sand characteristics can be controlled and changed to satisfy specific requirements.

Carbon content is controlled by adding CROWN HILL SEACOAL. Green and dry strengths are varied through the addition of FEDERAL GREEN BOND. Flowability is provided by adding FEDERAL SAND STABILIZER.

There are other advantages, too! You can use common lake, river or beach sand for heap or system replacement. So, there's no danger of sand grain size being thrown out of balance—as happens when offals of cores made of coarse sand, mix in with the fines necessarily used with emulsified asphalt or resin additives. And most important of all—*these three additives will cost you less than $1.00 per ton of castings produced!*

Write today for your copy of new bulletin describing this *better* method of sand preparation and control.

CROWN HILL SEACOAL

Produced by *Federal* at Crown Hill, West Virginia. *High* in volatile combustible material, low in sulphur and ash content—basic requirements for a top quality seacoal. Ground or granulated to properly match the sand used.

FEDERAL GREEN BOND

Mined, processed and guaranteed by *Federal*. Unexcelled in uniformity and ability to develop green and dry strength. Possesses many times the natural bonding power of any other sand bond. Truly the best of the bentonites!

FEDERAL SAND STABILIZER

A processed cellulose sand additive whose high combustibility allows sand to expand evenly to eliminate casting defects. It increases sand flowability to provide better ramming conditions and attracts moisture to broaden the safe moisture range.

IMPORTANT . . . Federal Sand Stabilizer also holds lumpy shakeout to an absolute minimum!

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FOUNDRY

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JULY 1953

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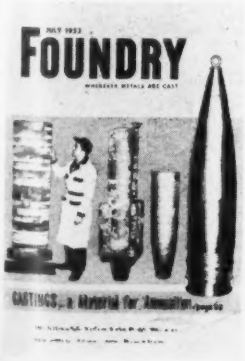

THE COVER: Four steps in the production of castings for shells are shown in sequence. See page 88

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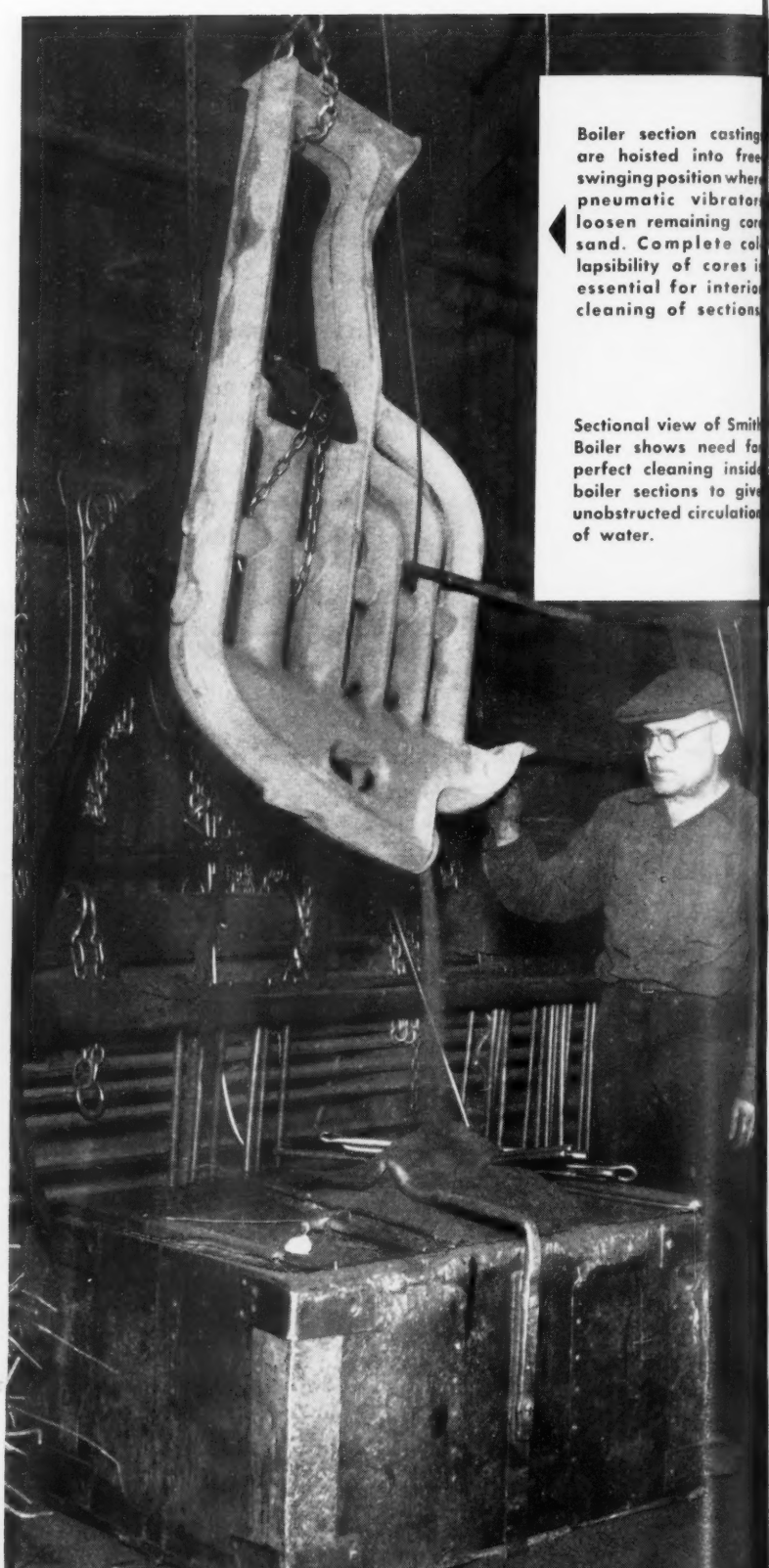
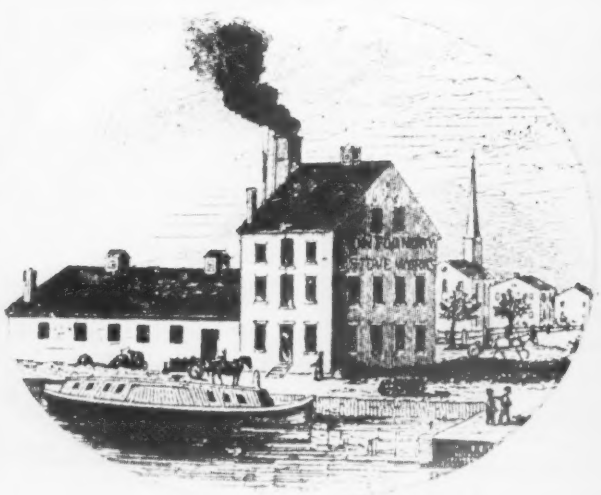
boiler cores shake out like sugar..

with LINOIL

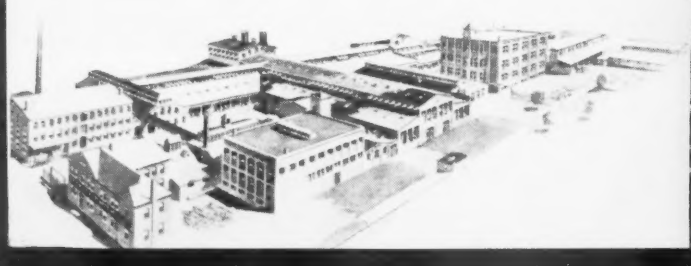


Boiler section castings are hoisted into free swinging position where pneumatic vibrators loosen remaining core sand. Complete collapsibility of cores is essential for interior cleaning of sections.

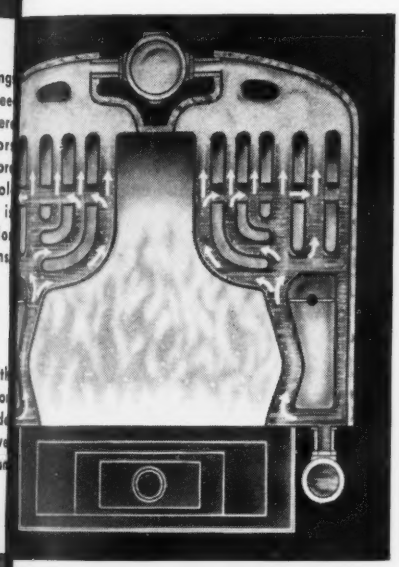
Sectional view of Smith Boiler shows need for perfect cleaning inside boiler sections to give unobstructed circulation of water.

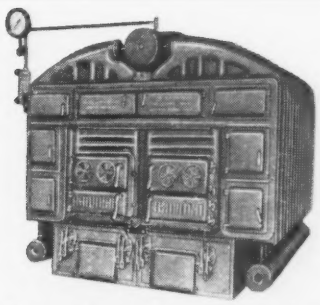


THE H. B. SMITH CO., INC., Westfield, Mass., a century old this year, has used **LINOIL** exclusively since 1929.



LINOIL





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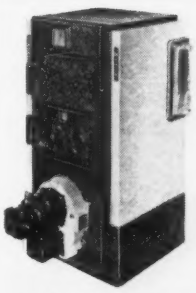
Smith "Century" Special Gas Boiler for homes and small buildings.

H. B. SMITH, one of New England's pioneer foundries, mass produce quality boilers for homes, factories and public buildings.

Bottlenecks are eliminated in the cleaning department because cores made with LINOIL are completely collapsible —they shake out like sugar. No sand is left inside to cause obstructions.

If you are having "internal trouble" (that is, in cleaning out casting cavities) call in your ADM representative to demonstrate the collapsibility of LINOIL-mixed cores.



Smith-Mills Oil Burning Boiler for homes.

Smith-Mills boiler for smaller commercial buildings.

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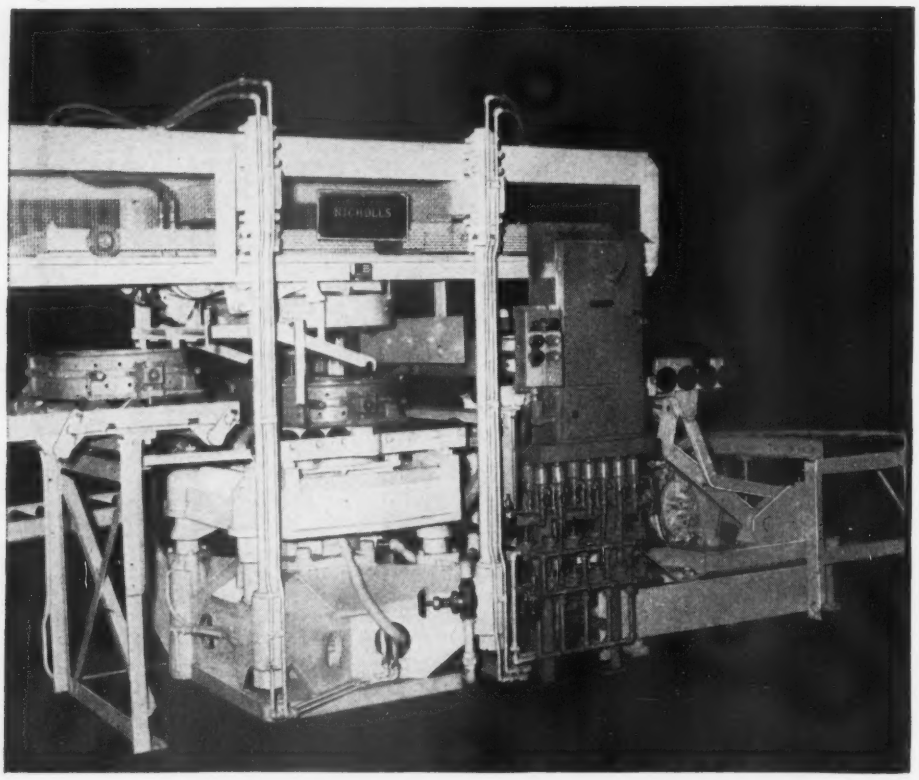
LINOIL	INDUCTOL	FRE-FLO	LIN-O-CEL
CORE OIL	FAST-BAKING CORE OIL	PARTING COMPOUND	SAND STABILIZER

ARCHER • DANIELS • MIDLAND COMPANY

FOUNDRY PRODUCTS DIVISION • 2191 WEST 110TH STREET • CLEVELAND 2, OHIO



No. 21 Type C. F.— Jolt, Squeeze and Pattern Draw — Automatic - Push Button Control

(Also Made in Smaller and Larger Sizes)

New "Push-Button" Operation Takes The Guesswork Out of Molding

From start to finished mold, the Nicholls #21 Type CF Jolt, Squeeze and Pattern Draw Molding Machine is push-button controlled to eliminate dangerous risks, costly mistakes—to give you better molds *continuously*. Precision built for long years of service . . . made with all the safety-devices, the hidden "quality points" that reduce maintenance costs . . . the know-how that almost half a century of building quality molding machines has made possible. If you're interested in better quality molds at lower cost — investigate these machines now.

For complete information, write to:

William H. Nicholls Co., Inc.

Richmond Hill 18, Long Island, New York

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Shown above is the woodworking shop at City Pattern where the crafting of accurate master patterns is a thoroughly efficient procedure. Here you find men who know every phase of pattern making and have practiced it to its finest skill. The latest lighting techniques promote painstaking accuracy without undue eye strain . . . an accoustical ceiling deadens noise for careful concentration without fatigue . . . the latest woodworking equipment assures maximum economy in every step of the procedure.

These are but a few of the reasons why leading manufacturers rely on City Pattern for the utmost in accuracy, economy and production utility in wood and metal patterns.

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City Pattern's Shrinkage Conversion Tables save time and eliminate errors in shrinkage calculations. Your letterhead request will bring one without obligation.

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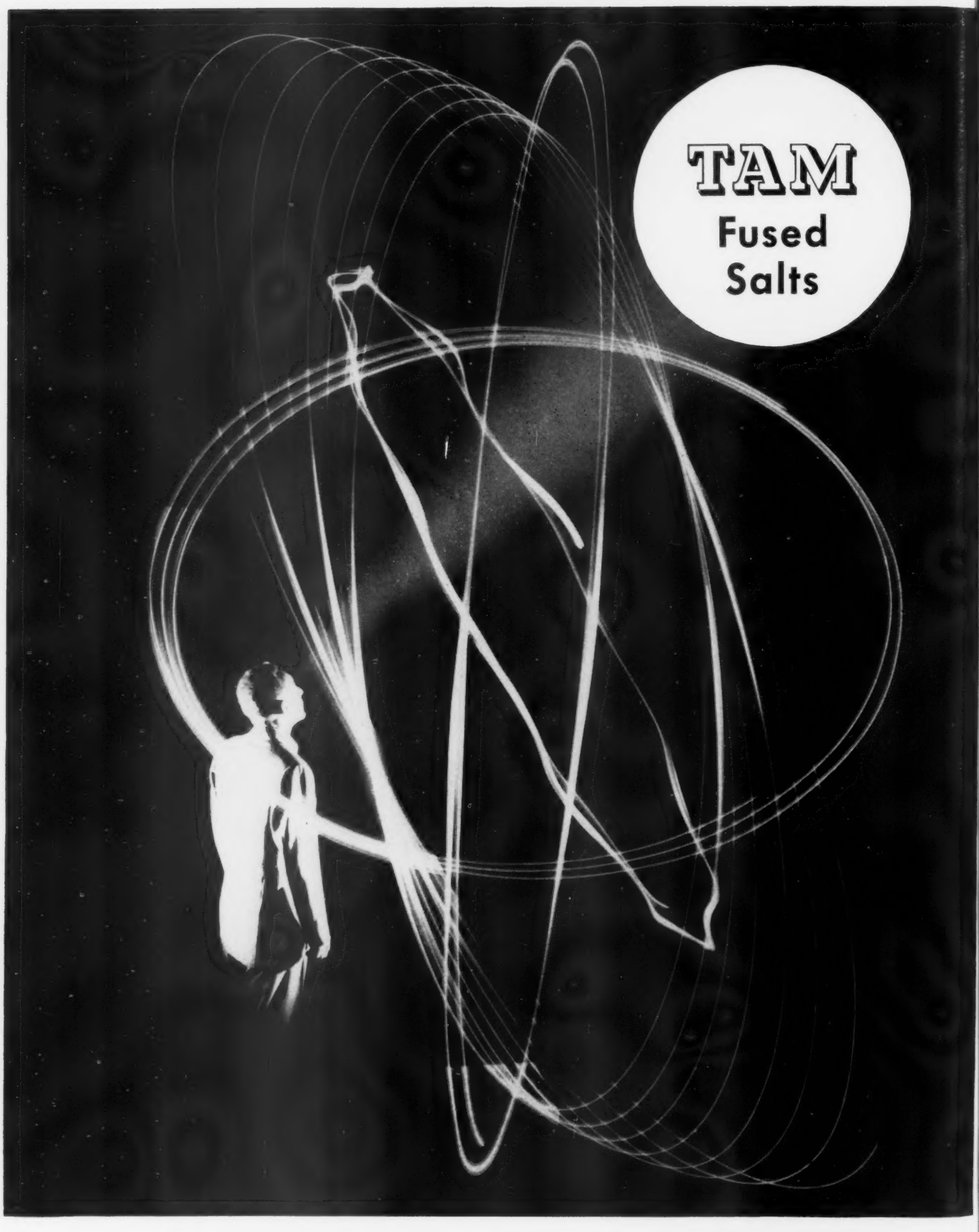

HAVE YOU INVESTIGATED THE ADVANTAGES OF TAM FUSED SALTS RECENTLY?

These TAM products are finding increasingly successful use as a source of zirconium for magnesium alloys. By refining grain size, they help improve strength in castings and eliminate problems in extruding bars. Ask our field engineers for details or write us at New York.

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$1250.00

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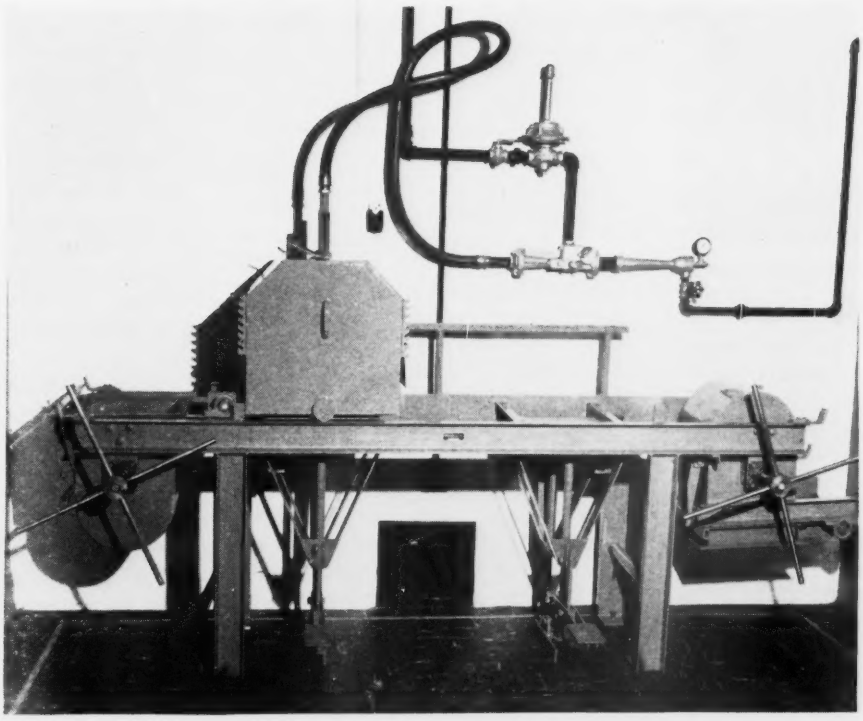

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13" x 24"

$1750.00

PLUS HEATING UNITS.

F. O. B. St. Louis Mo.

IT'S PROVEN ENGINEERED IN OPERATION

ALL STEEL ONE UNIT MACHINES—TWO STATIONS—ONE COPE—ONE DRAG—OR BOTH TWO DUMP BOXES—TWO EJECTION STRIPPERS—AUTOMATIC LOCKING DEVICES

These shell molding machines are equipped with either gas or electric heating units, which are interchangeable and can be raised or lowered according to the height of the pattern. They are proven and are now in operation in many ferrous and non-ferrous foundries. We also have fully automatic machines making castings from pattern plates sizes 24" x 26" that sell for $6,000.00 F.O.B. St. Louis, Mo. The production rate of this machine is one every 45 seconds.

TYLER METAL TYCO *Products Company*

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ST. LOUIS 6, MO.

NATIONAL TOOL & DIE MANUFACTURERS ASSOCIATION — Tool & Die — MEMBER

VISIT OUR SHOW ROOM AND SEE THIS MACHINE IN OPERATION

TYLER METAL PRODUCTS CO.—
10th & Mullanphy, St. Louis, Mo.

I AM INTERESTED

☐ In seeing machine in operation

Date ..... Time .....

☐ Would like someone to call on our company with more information

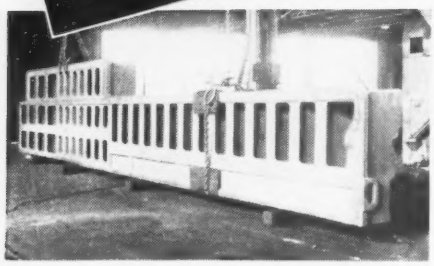
Date ..... Time .....

Company Name .....

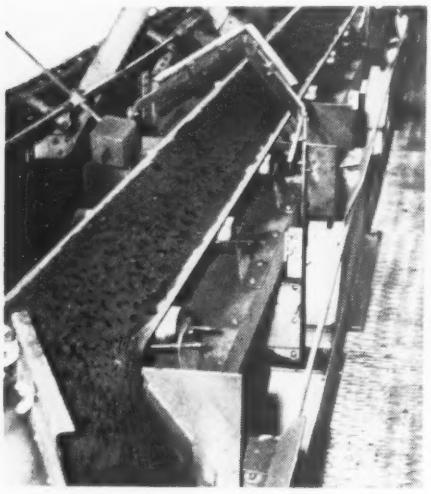
Address .....

Signed ..... Title .....

Imperial Belting helped make this 30-ton casting



■ This giant roll grinder bed casting, made by Landis Tool Co., Waynesboro, Pa., is more than 43 feet long and weighs 59,790 pounds. Large quantities of synthetic sand at temperatures up to 500 F.° were required in its production. Imperial heat-resisting conveyor and elevator belts performed this vital moving job efficiently and economically —and without breakdowns, delays or other trouble.



Job-Designed for You

Imperial Standard Sahara withstands temperatures up to 300°F.; Insulated Sahara up to 450°F. Super Insulated Sahara is recommended for temperatures through 600°F. Whatever your own belting needs may be, Imperial can provide job-designed belting that is unequalled for dependability, long life and operating economy.

Write us for further information.

Imperial

BELTING CO.

1755 S. Kilbourn Ave., Chicago 23, Ill.

With the Editors

LOOKING AHEAD: The editors have planned something a bit special for the August and September issues. In August, Bob Herrmann has a comprehensive article on the application of conveyor belting to foundries, and the fine AFS Hoyt lecture by James H. Smith of Central Foundry Division on "Opportunities in the Foundry Industry" will be presented in full. September will feature a roundup of articles on progress in a number of European countries to serve as plant tours for those of us who will not attend the International Foundry Congress at Paris Sept. 19-26.

—o—

Marking Birthdays: Four anniversary books have crossed the desk recently to provide much pleasure for anyone who has lived through a part or all of the years that are described. But it does seem that at least some of these books should be required reading for the young people of today, since they tell of the beginnings and growth of industrial organizations in periods of varying opportunities and concepts of responsibilities.

A Century on Wheels, by Stephen Longstreet (Henry Holt & Co.), is the story of Studebaker, an organization started in South Bend, Ind., on Feb. 16, 1892, by Henry and Clem Studebaker to shoe horses and repair wagons. Growth of that company, at first under the guidance of the five Studebaker brothers, and the transition from horse-drawn to motor-driven vehicles is one of the interesting stories of American industry.

Sand in Their Shoes, by Franklin M. Berk and illustrated by John Langston, tells the story of the organization and progress of American Steel Foundries. In fact, the story opens ten years before American Steel Foundries came into existence, when James G. McRoberts poured a cast steel wheel in a green mold at the Schickle, Harrison & Howard Iron Co. at St. Louis, and thereby lifted the horizon for cast steel. This interesting tale, and the origins of the foundries which grew into the American Steel Foundries just 50 years ago, are told in the first chapter of this book. This chapter will be presented in a future issue of FOUNDRY.

The Norton Story, by Mildred McClary Tymeson, was "written while folks, who have lived through the 68 years of our history and who knew our founders, are still with us." This is the story of the men who started that company, and the men who brought about progress. It is a story of abrasives and machines and the contributions of the Norton company to that progress. The author has provided some very interesting reading.

Ford at Fifty, (Simon and Schuster Inc.) is a beautiful pictorial story of the tremendous changes that have taken place in the countryside and our mode of travel during the past 50 years, and the contributions of Henry Ford and his company to that revolution. It's a fine story of men and machines.

—o—

The Halls Move: John Howe Hall, foundry consultant, member of FOUNDRY's editorial advisory staff and the author of many articles presented in this publication, has moved from Swarthmore, Pa., to New York state. There Mr. and Mrs. Hall will be nearer to some of the younger members of the family. The new address is: 154 Martling Avenue, Ridgecroft Apartment Bldg., No. 6, Apartment M-3, Tarrytown, N. Y.

—o—

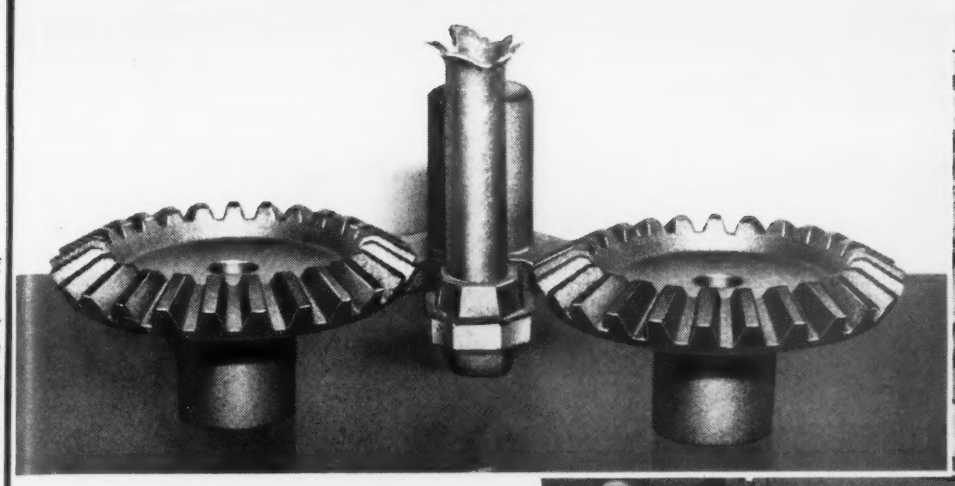
No Orphan Annie? Erle Ross, Chicago editor, has sent along the following from a recent issue of the *Chicago Tribune:*

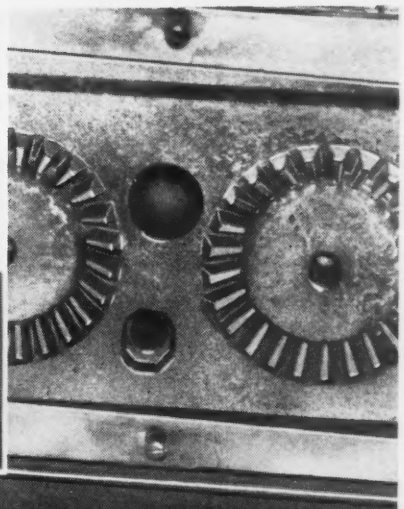
British Foundrymen Ask
a Curb on Comic Strips

Scarborough, England, May 30 (Reuters) — Delegates from 80,000 union foundry workers yesterday adopted a resolution asking the government to ban American style comic strips. One delegate, W. Simpson, said that no such ban would succeed until British tastes were educated above "gang warfare, sexy gun molls, and so forth."

Now these boys can turn down our gifts, criticize our constitution and take us apart in other ways. But when they attack our favorite section of the morning paper, we are likely to protest. Perhaps we missed selling

(*Concluded on page* 12)





ABOVE: Held in the sprue, AlSiMag Strainer Cores do not contaminate the scrap but float off in the melt.

AT RIGHT: AlSiMag Strainer Core in gate of mold.

Photos courtesy Ross-Meehan Foundries.

ALSIMAG® STRAINER CORES

Far better, more economical than Sand Cores!

- *AlSiMag Cores are best by actual comparative tests on gray iron, Meehanite® and steel!*
- *No Strainer Core troubles since using AlSiMag!*
- *Used principally on Meehanite® which pours at 150° higher than gray iron!*
- *Used exclusively for three years!*

SAMPLES: Make your own comparative tests! Samples of standard sizes sent free on request. Special test samples to your specifications made at low cost. Test these, compare them with any refractory or sand core for cost and performance! Ask for folder.

ROSS-MEEHAN FOUNDRIES

CHATTANOOGA, TENN.

April 14, 1953

Mr. Carl Day
American Lava Corporation
Chattanooga, Tennessee

Dear Mr. Day:

You inquired about our experience with AlSiMag strainer cores which we have used exclusively for the past three years. It has been excellent.

Every foundryman knows that strainer cores are good. For a long time we made our own sand cores. They were not economical. The first cost was less than AlSiMag strainer cores but the ultimate cost much higher. With sand cores, pieces of sand are eroded by the metal stream and carried into the casting or the sand core breaks during the pour. Sand cores are also relatively weak, slow to handle, easily ruined by moisture.

Since sand cores were not satisfactory, we tested various makes of refractory strainer cores. Three makes were tested and found unsatisfactory.

The AlSiMag Strainer Cores we now use were then tested in gray iron, Meehanite and steel castings. They stood up under all tests and we have had no strainer core troubles since using your cores.

Most of the AlSiMag strainer cores we use are on Meehanite castings. Since Meehanite poure at about 150° higher temperature than gray iron, we think this is an exceptionally good test of the quality of your cores. We have just run 10,000 castings without having to throw away a single casting because of defects caused by failure of strainer cores.

Based on our experience, we can unhesitatingly recommend AlSiMag strainer cores.

Very truly yours,

Frank M. Robbins
President

52ND YEAR OF CERAMIC LEADERSHIP

AMERICAN LAVA CORPORATION

CHATTANOOGA 5, TENNESSEE

OFFICES: Philadelphia • St. Louis • Chicago
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SIMONDS
ABRASIVE CO.

Grinding Wheels

built for the toughest grind!

Heavy production snagging! Micro-inch finishing! Cutting off! Grinding in hard-to-reach places! Just name *your* toughest grind . . . and your Simonds distributor will supply the wheels to do the job right. And you can count on this satisfaction and dependability whether you buy Simonds grinding wheels, mounted wheels and points, segments or polishing grain. They're all quality-controlled products . . . second to none for efficient lasting performance and low grinding costs. Even if your toughest grind calls for *special* wheels, Simonds engineering service is at your disposal.

Write for free data book and name of your Simonds distributor.

SIMONDS ABRASIVE CO., PHILADELPHIA 37, PA. BRANCH WAREHOUSES: CHICAGO, DETROIT, BOSTON

DISTRIBUTORS IN PRINCIPAL CITIES

Division of Simonds Saw and Steel Co., Fitchburg, Mass. Other Simonds Companies: Simonds Steel Mills, Lockport, N.Y. Simonds Canada Saw Co., Ltd., Montreal, Que. and Simonds Canada Abrasive Co., Ltd., Arvida, Que.

(*Concluded from page* 10)

the Productivity Teams on this particular form of American entertainment.

—o—

For a Job Well Done: Representatives of the ferrous trade associations recently thanked John M. Price, Ferro Machine & Foundry Inc., Cleveland, for his service to the ferrous foundry

industry in the Office of Price Stabilization, Washington. Illustration shows A. J. McDonald, (right) president, Steel Founders' Society of America, making the presentation to Mr. Price.

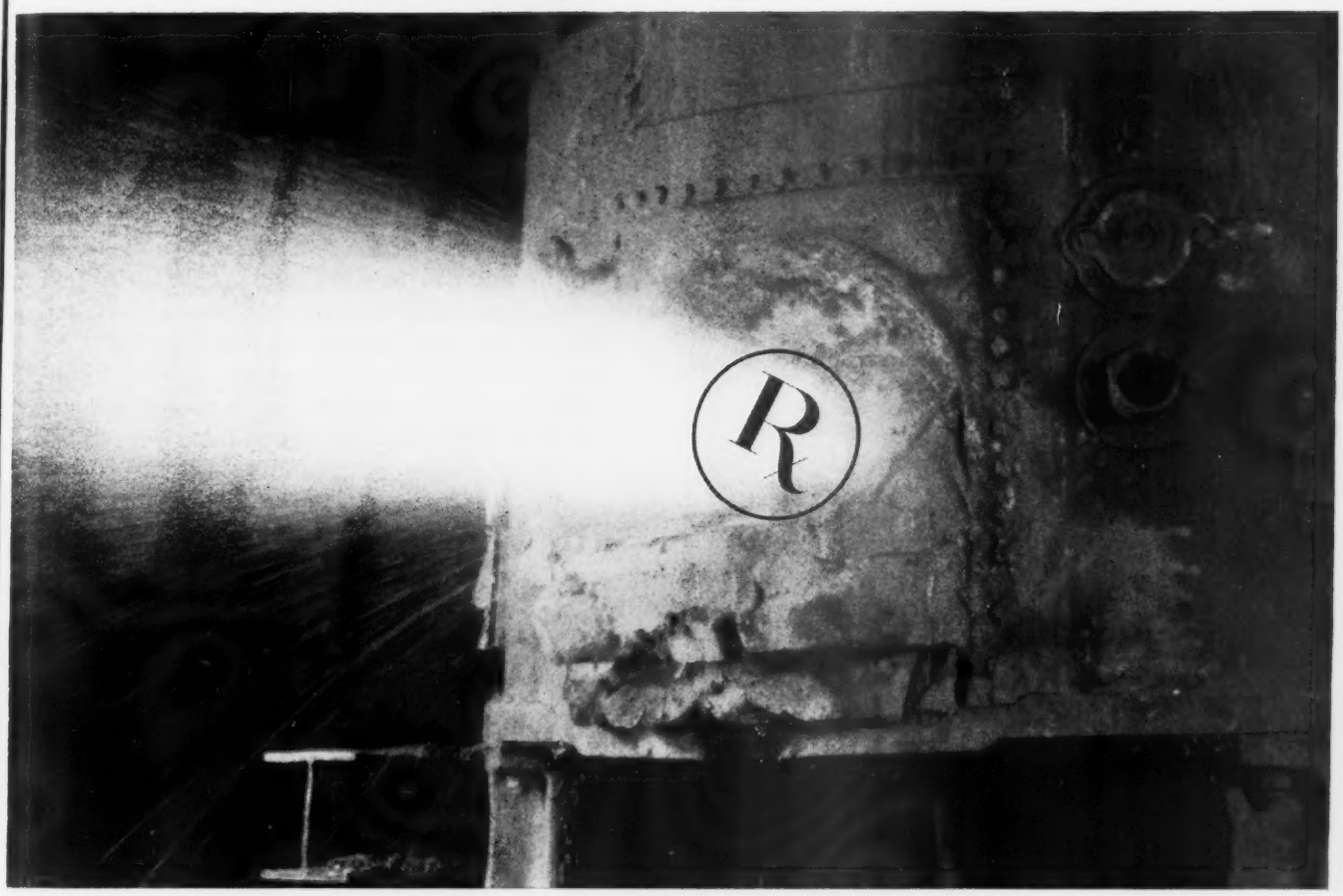
—o—

A Market Grows: A recent outstanding example of what can be done in building a market for castings is to be found in the field of pearlitic malleable. A relatively few companies have provided the sales push that has developed applications and created the possibility of a further expanded market. Since the Wagner Malleable Iron Co., Decatur, Ill. is one of those progressive organizations in the field of pearlitic, the editors are pleased to have the opportunity of presenting in this issue the interesting and instructive article, "Pearlitic Malleable Castings" by Harvey E. Steinhoff, vice president, and Lyle Jenkins, metallurgist, of the Wagner company.

—o—

A Challenge to Foundries: Another article in this issue presents a challenge to the foundry industry. Frank E. Shumann, chairman of the board, Lehigh Foundries Inc., Easton, Pa., in the article "Castings—A Material for Ammunition," tells what a few foundries have done in obtaining recognition by the Ordnance Department of the availability and utility of cast shell. In case of a major emergency, the military undoubtedly will need help in this particular field. Therefore, Frank's article is recommended for careful consideration by every foundry with facilities and personnel capable of participating in the development. F.G.S.

Here's your Rx for longer metal-melting runs...



Up to 64 Hours Continuous Service! In foundries everywhere, Norton CRYSTOLON* slag hole blocks are chalking up new records for operation without shutdown.

Norton slag hole blocks

Extra long service life . . . no softening or spalling at temperatures up to 3050°F . . . 5 to 15 times greater resistance to corrosion and erosion than you could ever get with fire clay blocks!

That's your Rx — another Norton "special refractory prescription" — for increasing production and cutting the time and trouble of your metal melting operations.

Fill that Rx by standardizing on Norton slag hole blocks. Made of CRYSTOLON refractory material — extremely dense to resist slag penetration and chemical attack — they'll give you the longest, most dependable service you can get, reducing your maintenance and replacement costs to new, profit-boosting lows!

CRYSTOLON slag hole blocks are made in shapes to meet every foundry requirement. See your Norton Representative for complete facts. Or write to NORTON COMPANY, 306 New Bond Street, Worcester 6, Mass. *Canadian Representative:* A. P. Green Fire Brick Co., Ltd., Toronto, Ontario.

*Trade-Mark Reg. U. S. Pat. Off. and Foreign Countries

NORTON

Special REFRACTORIES

Making better products... to make other products better

NORTON COMPANY, WORCESTER 6, MASSACHUSETTS

YOU'LL DO A BETTER JOB

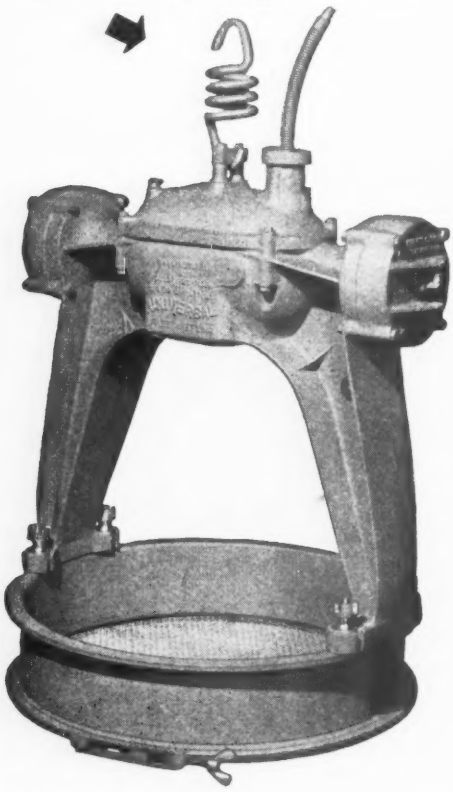
with **H. V. ADAMS DESIGNED**

HIGH EFFICIENCY FOUNDRY TOOLS

"UNIVERSAL FREE WHEELING"

FOUNDRY SAND RIDDLE

with the Double Eight Vibration

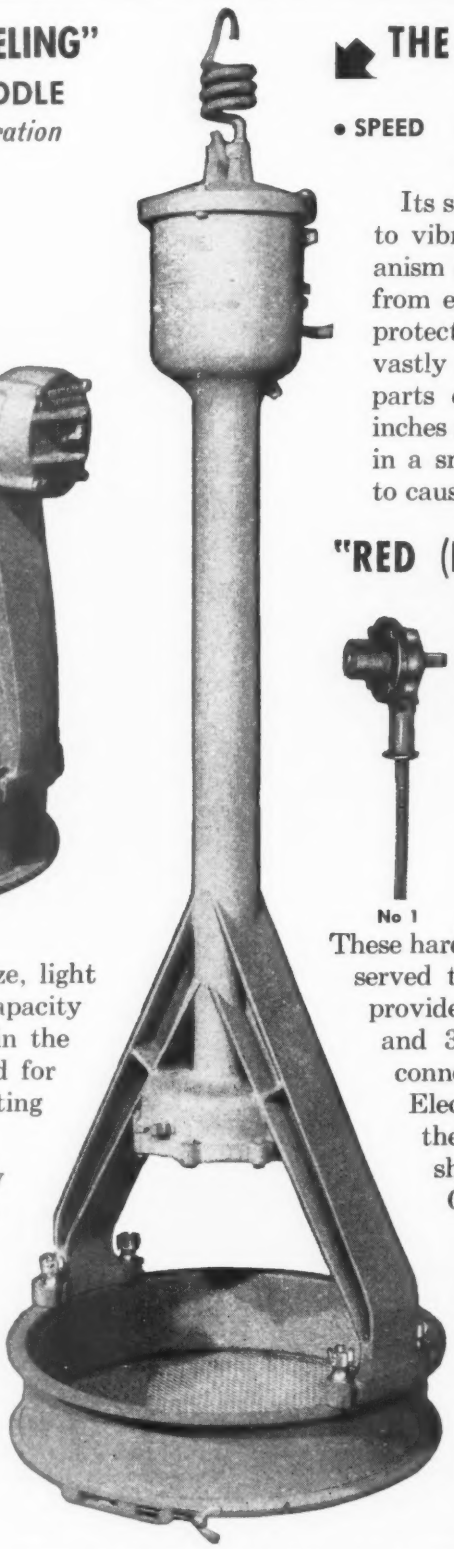


Because of its convenient size, light weight and good riddling capacity it long has been a favorite in the foundry. It also can be used for mixing core sand or for sifting sand directly into molds.

The mechanism is entirely enclosed protecting it from harmful dust and grit.

The main frame is cast in very strong tough aluminum.

It uses quick change ferruled sieves with 20 in. diameter sifting area. There are no loose wires to harm hands.



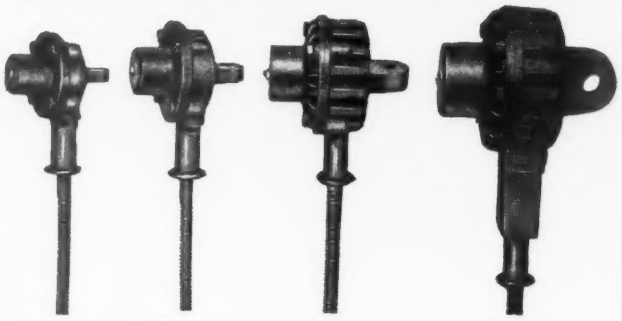
THE "ROTOPLANE" SPEED SIFTER

WILL GIVE YOU

- **SPEED**
- **ECONOMY**
- **SAFETY**
- **LONGER LIFE**
- **GREATER SIFTING CAPACITY**

Its sturdy one-piece frame and long shaft add to vibration effectiveness. The sealed-in mechanism assures protection of motor and bearings from exposure to dust and grit. This sealed in protection and "Rotoplane's" free-rotary action vastly increase bearing life. No exposed moving parts endanger the operator. Sieves have 20 inches diameter clear sifting area — are mounted in a smooth steel ferrule with no jagged edges to cause dangerous cuts and scratches.

"RED (Devil) ELECTRIC" VIBRATORS



No 1 **No. 2** **No. 5** **No. 9**

These hard hitting Adams designed Vibrators have served the foundries for over 30 years. They are provided with a 6 foot 3 wire authorized cable and 3 wire grounded connector which, when connected with our 3 wire grounded Red Electric Knee Switch, automatically grounds the vibrator protecting the worker from shock. The vibrators have passed the U. S. Government code inspection.

Other Foundry Products:

- **No. 11 NOISELESS TYPE VIBRATOR**
- **A-20 ELECTRIC VIBRATOR**
- **RED ELECTRIC KNEE SWITCHES**
- **"ROTO" ADJUSTABLE BIN VIBRATOR**
- **2 MIN. UNIVERSAL FINENESS TEST SIFTER.**
- **UNIVERSAL TRIPOD CARRIER**

ORDER ALL SIFTERS AND VIBRATORS WITH GROUND WIRE!!

FOUNDRY SUPPLIES MANUFACTURING CO., NOT INC.

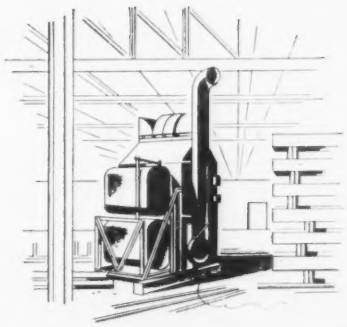
2221 Orchard Street - Chicago 14, Illinois

Established 1918 **Cable Address: "Rotoplane Chicago"** **H. V. ADAMS, Mgr.**

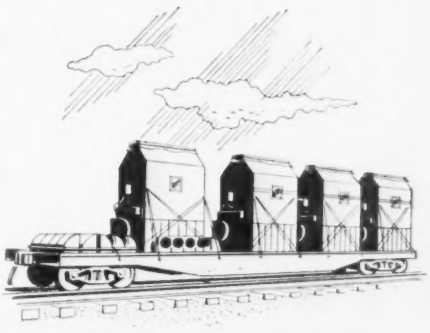
These 12 DRAVO *Counterflo* SPACE HEATERS really got around!

Here's where the Dravo Heater's rugged construction and durability paid off for Ford Motor Company.

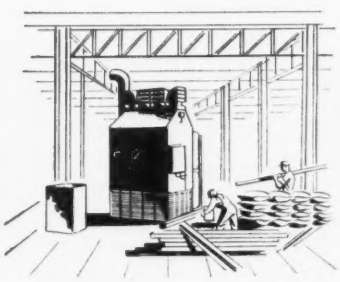
Back in the fall of 1950, Ford purchased 12 Dravo Heaters for temporary heating at Cleveland, Ohio, while Ford's new engine plant was under construction during the winter of 1950-1951.



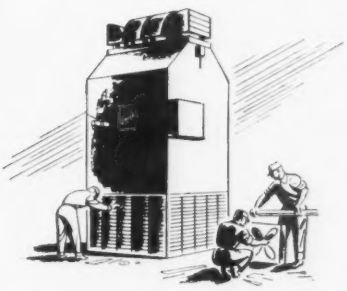
1 The heaters maintained comfortable working conditions and kept the ground from freezing during zero weather so that concrete could be poured.



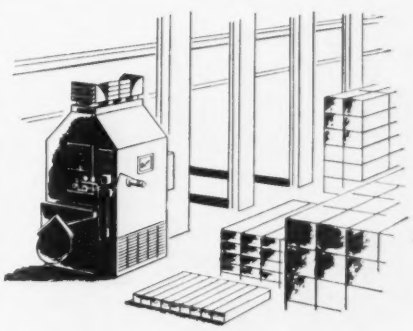
2 After this new plant was completed, four heaters were shipped to Canada and were permanently installed in Ford's warehouse at Winnipeg.



3 The other eight heaters were shipped to Kansas City, Mo., for use as temporary heaters during the construction of facilities similar to those in Cleveland.



4 When that job was finished, the eight heaters were returned to Dravo at Neville Island, Pittsburgh, for overhauling and reconditioning by highly-skilled Dravo personnel.



5 Now these eight Dravo *Counterflo* Heaters have been permanently installed for comfort heating at Ford's assembly plant at Buffalo, New York.

Only Dravo *Counterflo* Space Heaters could stand up under such extraordinary treatment and frequent moving. Dravo Heaters are a product of top-flight engineering and planning; their mill-type, heavy construction means long life, low maintenance and years of satisfactory service.

Dravo Heaters, backed by over 60 years of engineering experience, are available now in a range of sizes from 400,000 to 2,000,000 Btu. Find out how these superior Dravo Heaters can benefit you. Write for more information. Use the coupon.

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DRAVO

Send me information about heating for the subjects I've checked, and Dravo Heater Catalog PQ 52 -1

- ☐ Space heating industrial buildings, warehouses, garages, hangars.
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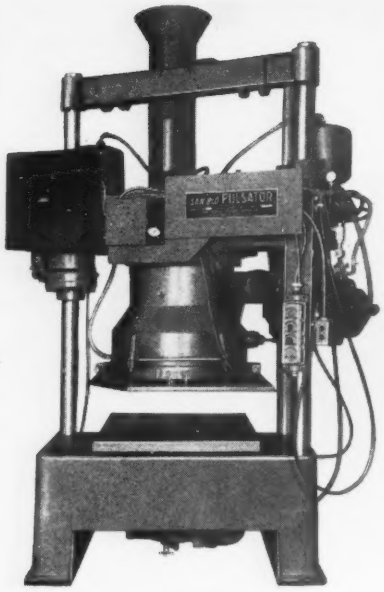
- ☐ Tempering make-up air.
- ☐ Temporary heating.
- ☐ For use in conjunction with air conditioning.
- ☐ Please have a representative call at no obligation to me.

Name _____ Title _____

Company _____ Address _____

City _____ Zone _____ State _____

There's a SAN-BLO for every requirement

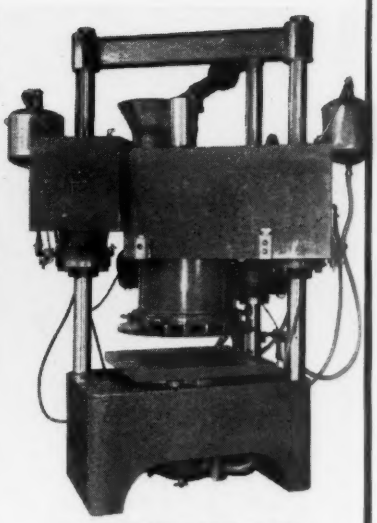


PULSATOR MODEL P-250

For blowing cores weighing from 5 to 250 lbs., in wood and metal core boxes. Completely automatic operation, including magazine refill. Push button control for raising and lowering sand magazine.

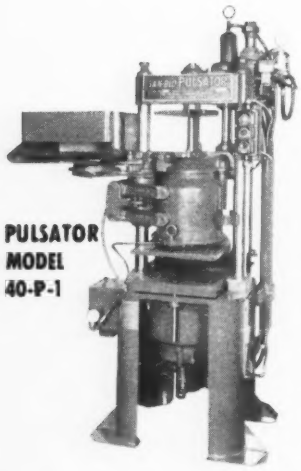
In addition to the core blowers shown here, there are 29 other SAN-BLO models, offering a wide choice of controls and features, to meet YOUR requirements.

All "40" model SAN-BLO machines will blow cores weighing from ½ to 40 lbs. each, using one standard sand magazine. All models shown here have a 6" stroke, clamp-draw table.



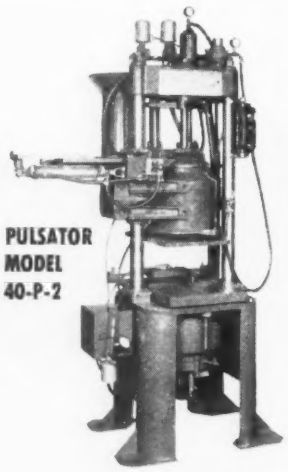
PULSATOR MODEL P-150

For blowing cores weighing from 5 to 150 lbs., in wood and metal core boxes. Completely automatic operation, including magazine refill. Push button control for raising and lowering sand magazine.



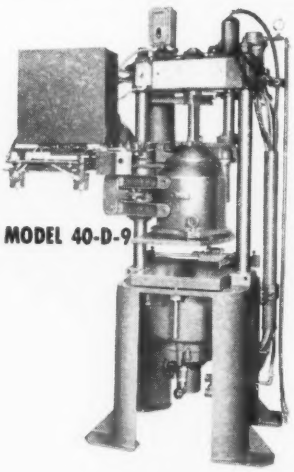
PULSATOR MODEL 40-P-1

The all-purpose machine—blows cores in wood and metal boxes. Magazine is swung over to sand hopper manually, for refilling.



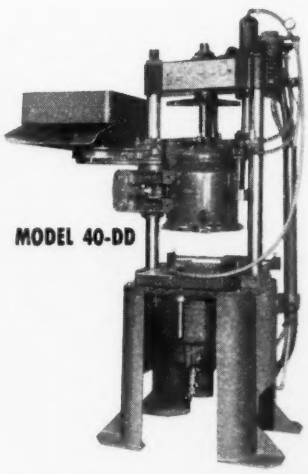
PULSATOR MODEL 40-P-2

Same as Model 40-P-1, except that magazine is moved under rear-mounted hopper by an air cylinder controlled by a hand valve.



MODEL 40-D-9

Full automatic and electrically timed for fastest production of cores in metal boxes. A single starting button controls entire operation.



MODEL 40-DD

Performs same functions as the 40-D-9, except that all operations are manually controlled. Sand hopper is filled from the floor.

...'S THE TIME

...o install

COST-REDUCING EQUIPMENT

your first step is to check the SAN-BLO . . . the modern, high production, all purpose core blower

. . . and here's proof of the SAN-BLO's efficiency, in the form of excerpts from letters received from just a few of the hundreds of foundries now using SAN-BLO core blowers . . .

1. *"We have production jobs with astounding savings figures, some as high as 88%, plus the savings of one 12" core rod ¼" in diameter for each core, and that alone is a lot of money when figured on a production use of 60,000 cores per year."*

2. *"We formerly made 80 runner cups per hour on a small jolt rollover machine. Since we have put this job on the SAN-BLO, we have increased our production to 150 cores per hour."*

3. *"Upon purchasing the SAN-BLO, we found that we could blow mixes which previously could not be blown in our conventional type core blowers."*

4. *"With our Pulsator model SAN-BLO, we have blown hundreds of wooden core boxes formerly rammed on the bench, with exactly the same boxes, without any venting and many times without the rods and wires required in the hand-rammed core. One great advantage is the fact that there is practically no set-up or change time between boxes."*

5. *"We have blown intricate cores with one blow hole, using various sand mixes that were practically impossible to blow with other types of core blowers."*

6. *"We have a pair of runner cup boxes with approximately 50,000 cores run on them, and all the work done on them has been to change vents twice."*

For complete information on the SAN-BLO, phone your Federal representative or write us direct.

FEDERAL

"SERVING THE FOUNDRY INDUSTRY FOR FORTY-FIVE YEARS"

The **FEDERAL FOUNDRY SUPPLY** *Company*

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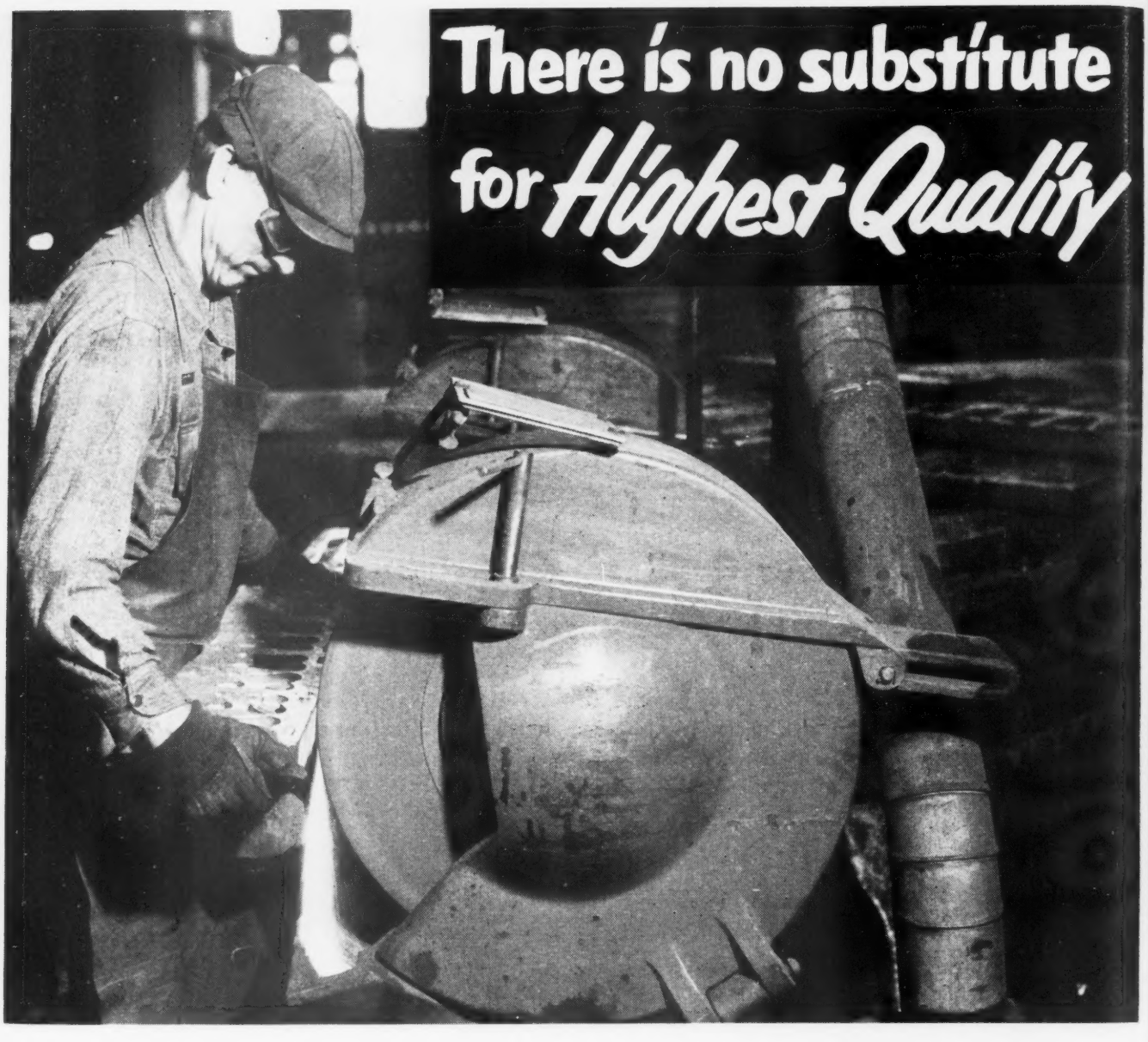

Specify Macklin Grinding Wheels to give uniform results for all your foundry jobs. Tried and proved, over many years they will give you cost saving results and "Protect Your Production".

Long experience, with competent engineering and research facilities, at Macklin, have provided the best grinding wheels for all types of Foundry grinding requirements.

Ask for the services of a Macklin Field Engineer.

MACKLIN COMPANY

Manufacturers of GRINDING WHEELS AND OTHER ABRASIVE PRODUCTS

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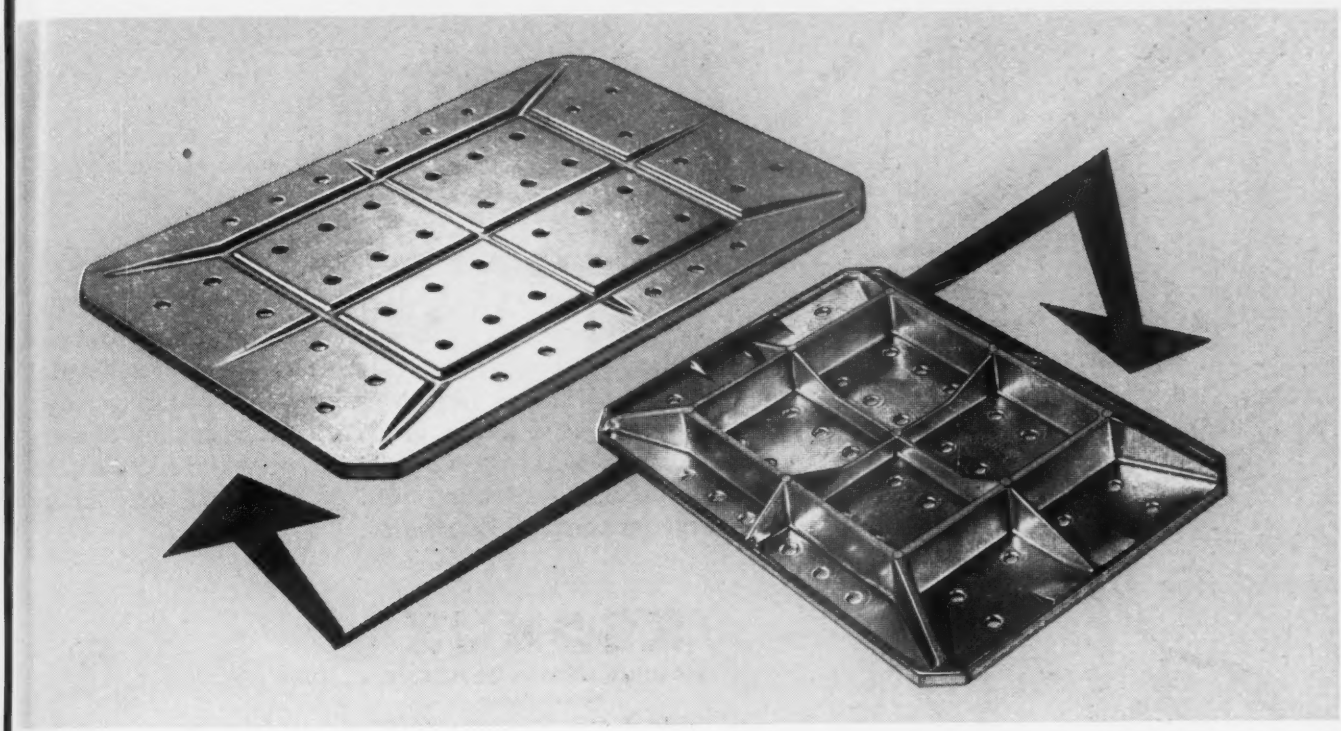

Look into both sides of the EDCO Dowmetal BOTTOM BOARD STORY...

-the design side...and the dollar side

Simple arithmetic is all you need to understand why the Edco Dowmetal Bottom Board story makes sense to a growing number of foundrymen. It's as simple as 1 plus 1 equals 2 . . . and 2 plus 2 equals 4.

Two main features, illustrated here, quickly tell the Edco design story . . . tell why Edco Bottom Boards produce better castings:

1. **The flask side of an Edco Bottom Board is grooved and vented to permit escape of gases and to insure mold stability.**

2. **The opposite side is braced like a bridge, and the entire board is made of light-weight magnesium—gives you strength without weight for safe, easy handling and long board life.**

That's the Edco design story.

Edco Dollar Story Makes Complete Sense, Too

When you switch to Edco Dowmetal Bottom Boards you'll find, like other foundries, that you have made a good move dollar-wise, too . . . for these reasons:

1. They pay for themselves. One foundry switched to Edco and cut its burning and breakage loss from 70% per year down to 3%. Another foundry kept a 5-year comparison record and found that under identical circumstances its wooden boards had a "casualty" record of 7500 boards lost, contrasted with a mere 12 for its Edco Dowmetal Boards. The same company found, further, that the scrap loss was 20% less with the Edco Boards.

2. You'll find that volume production of the most popular board sizes makes your original (and only) investment less than you'd normally expect.

That's the Edco dollar story.

It costs next to nothing to get the full dollars and cents story. A minute of time and a 3-cent stamp does it if you act now—but it might cost you a lot in savings lost if you put it off. Use the handy coupon.

CHRISTIANSEN CORPORATION

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OAK PARK 1, ILLINOIS
ALUMINUM ALLOY INGOTS
MAGNESIUM ALLOY INGOTS

Without obligation, please send price schedule and list of 83 standard sizes available from stock.

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CONTROL
is our role!

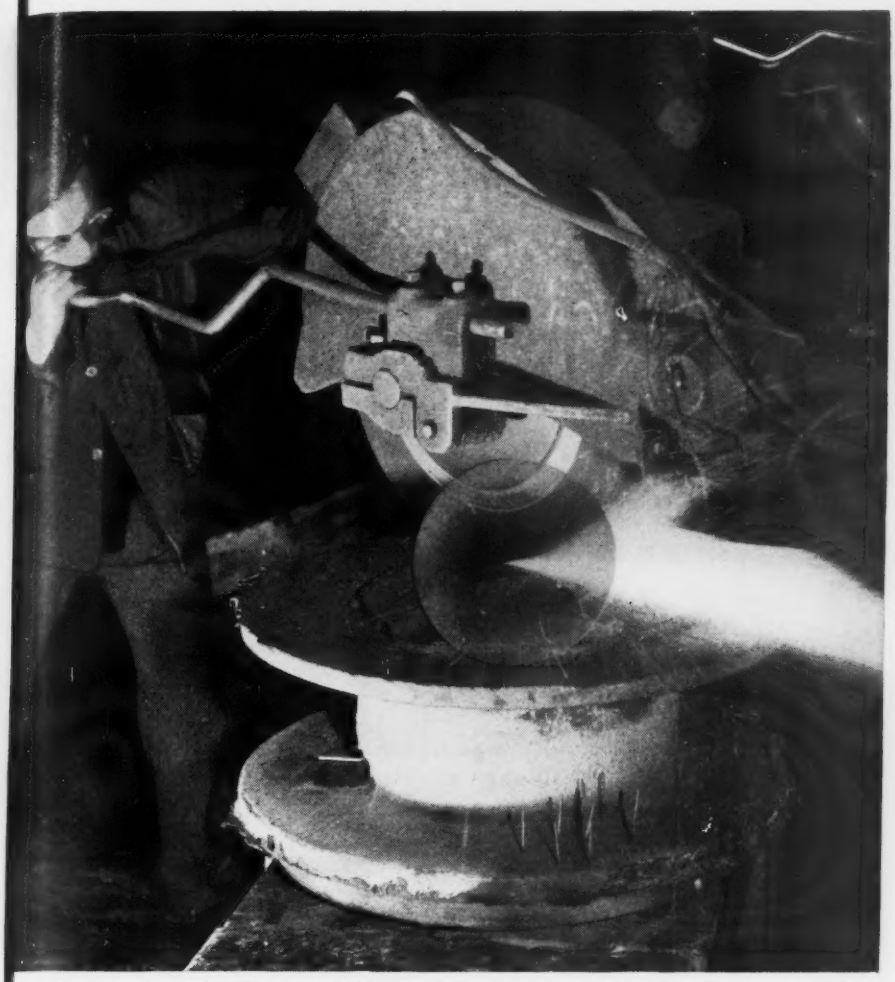
Controls are fundamental to successful railroad operation. And just as necessary to foundries and steel plants is the proper metallurgical control provided by Keokuk Electro-Silvery. Here is your assurance of precise percentages of silicon . . . and exact combinations of manganese, chrome or nickel alloys to suit the melt. The final result is better control of both quality and costs. So look into Electro-Silvery *now* . . . write for complete information.

KEOKUK
ELECTRO METALS COMPANY
Keokuk, Iowa
Wenatchee Division: Wenatchee, Washington

Keokuk Electro-Silvery . . . available in 60 and 30 lb. pigs and 12½ lb. piglets . . . in regular or alloy analysis. Keokuk also manufactures high silicon metal.

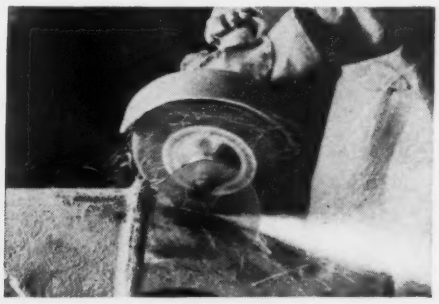
SALES AGENTS: MILLER AND COMPANY
332 S. Michigan Ave., Chicago 4, Illinois
915 Olive St., St. Louis 1, Missouri
3504 Carew Tower, Cincinnati 2, Ohio

Everyone's busy at controls around this railroad. Chief Keokuk indicates that No. 999 is on time; Junior throws the switch; and Princess Wenatchee makes sure that signals are all in order.

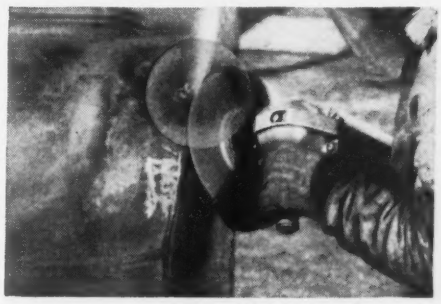


On swing frame grinders Norton wheels stand up under heavy grinding pressures at high speeds, combining fast, clean cutting action with extra long wheel life. For high tensile strength metals use ALUNDUM* abrasive; for low tensile metals, CRYSTOLON* abrasive.

On floor stands you grind faster and at lower cost with Norton ALUNDUM or CRYSTOLON wheels. There's a right Norton abrasive-and-bond combination for every metal, every job.



On portable grinders the smaller Norton wheels do the same big job of cost cutting. With their inbuilt balance they *hug that work* — to grind more metal per man-hour.



On many jobs the versatile Norton Nylon-Reinforced Hub Wheels — BD rigid and BFR semi-flexible — are the fastest, easiest, *safest* wheels to use. They're ideal for weld grinding and similar finishing operations.

Bring out the hidden profits in your rough grinding with the

"TOUCH OF GOLD"

Rough grinding jobs *can* be as definite money-making operations as any other form of grinding.

And they *will* be when you add the "Touch of Gold" with Norton wheels that are exactly right for the work you're doing on the machines you're using.

Then you'll grind off more metal per dollar, increase production and cut costs every day, on countless routine jobs.

And you'll realize that the *hidden profits* in your rough grinding operations need only this time-and-money-saving "Touch of Gold" to bring them to light.

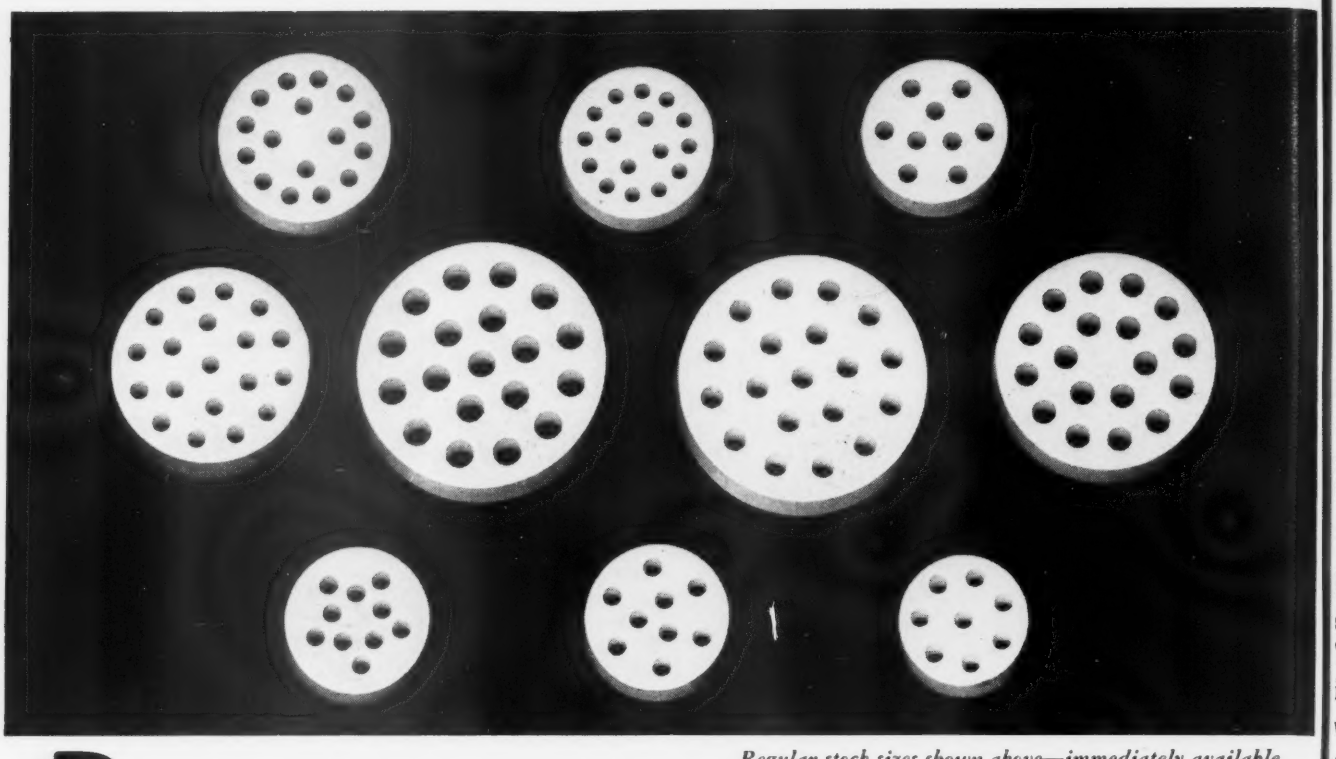
Your Norton Distributor

can bring long, practical experience to your rough grinding problems. If necessary, he'll call in your Norton Abrasive Engineer for expert advice on new or difficult applications. Backed by the world's largest manufacturers of abrasives, with the broadest line to choose from, these Norton men will make sure you get exactly the wheels you need.

Ask your Norton Distributor for Booklet No. 1405 . . . 54 illustrated pages covering every phase of rough grinding. Or write direct to NORTON COMPANY, Worcester 6, Mass. Distributors in all principal cities — look under "Grinding Wheels" in the yellow pages of your telephone directory. *Export:* Norton Behr-Manning Overseas Incorporated, Worcester 6, Mass.

NORTON
ABRASIVES
Making better products... to make other products better

*Trade-Marks Reg. U. S. Pat. Off. and Foreign Countries
W-1499

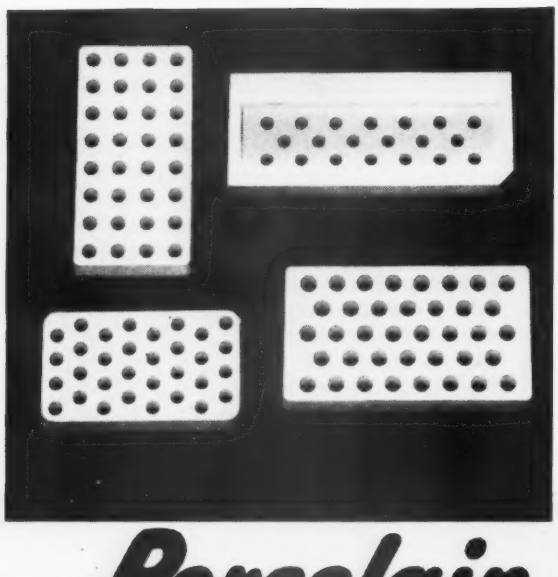


Regular stock sizes shown above—immediately available.

Positive METAL FLOW

...made possible with

PP INC. CERAMIC STRAINER CORES



Guesswork is eliminated and casting quality improved—where Porcelain Products Ceramic Strainer Cores are used. They provide a *positive* method of controlling pouring speeds. The holes in Porcelain Products extra high fusion point Ceramic Strainer Cores allow the molten metal to enter the mold at a pre-determined rate with no distortion or enlarging of pouring holes as experienced in oil bound cores through erosion and disintegration. Simply choose the strainer core that permits pouring at the rate you select, and control then becomes automatic.

There are more reasons, too, for using Porcelain Products Ceramic Strainer Cores. They turn out castings free from slag and sand inclusions—requiring less time in the cleaning room. They cut the number of rejects and reduce machining time. Porcelain Products Ceramic Strainer Cores withstand high heat, thermal shock, and can be stored indefinitely because changes in atmospheric conditions do not affect them. Available for immediate delivery in a wide variety of standard sizes. We also welcome inquiries on sizes designed to meet your special needs. Literature prints and samples available upon request.

Special sizes as shown at left produced to meet unusual specifications.

Porcelain Products, Inc.

FINDLAY, OHIO

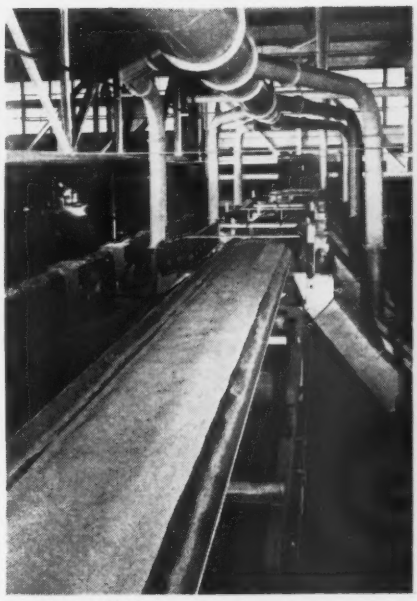
Distributed by: BUFFALO, Wark Foundry Equipment Co.; CHATTANOOGA, The Fischer Supply Co.; CHICAGO, Peterson Foundry Supply Co.; CINCINNATI, The Buckeye Products Co.; CLEVELAND, The Nock Fire Brick Co.; DAYTON, The Fenton Foundry Supply Co.; DETROIT, Refractory Sales Co.; LOS ANGELES, Independent Foundry Supply Co.; MILWAUKEE, Interstate Supply & Equip. Co.; PHILADELPHIA, Pennsylvania Foundry Supply & Sand Co.; ST. LOUIS, Refractories & Furnace Supply Co.; TOLEDO, The Freeman Supply Co.

NEW FORD FOUNDRY EQUIPPED WITH 7 MILES OF GOODYEAR BELTING

ONE of the largest and most modern foundry plants in existence, the new Ford Cleveland Foundry, is equipped with Goodyear Conveyor and Elevator Belting—7 miles of it. Many of the belts were spliced by vulcanization on the spot.

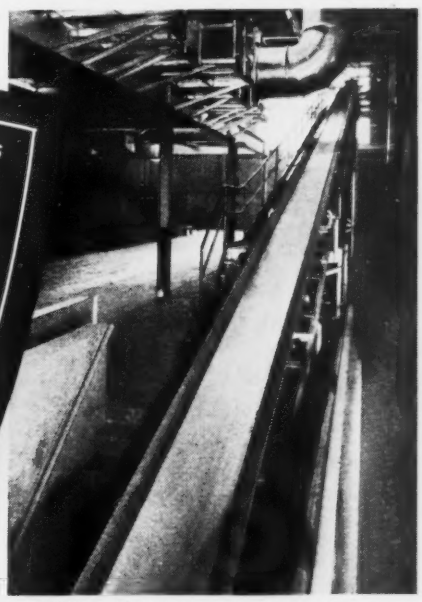
Belting for each installation was specified by the G.T.M.—Goodyear Technical Man—after he was called in by The Cleveland Foundry group, which did all design, layout and engineering for the new Ford plant.

In any foundry operation, it will pay to consult the G.T.M. *first* about belting requirements, for he knows rubber in all its forms better by far – your assurance of long, trouble-free service. You can reach him through your nearest Goodyear Distributor, or by writing:
Goodyear, Mechanical Goods Division, Akron 16, Ohio.



HOT LOADS ride on Goodyear Glass Carcass Conveyor Belting designed to handle materials in the very-high-temperature range.

ABRASION PROBLEMS are met with Style B Goodyear Conveyor Belts. Nearly 32,000 feet of Style B are in use handling abrasive materials.



OILY MATERIALS are easily handled by Goodyear-designed CHEMIGUM Belting—which resists swelling far better than ordinary rubber covers. CHEMIGUM also resists oil far better than many other "oil-resisting" synthetics.

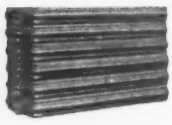
YOUR GOODYEAR DISTRIBUTOR *can quickly supply you with Hose, Flat Belts, V-Belts, Packing, Tank Lining, Rubber-Covered Rolls. Look for him in the yellow pages of your Telephone Directory under "Rubber Products" or "Rubber Goods."*

Chemigum—T. M. The Goodyear Tire & Rubber Company, Akron, Ohio

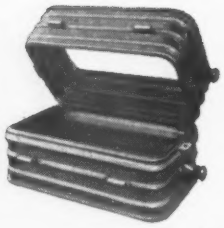
GOODYEAR

THE GREATEST NAME IN RUBBER

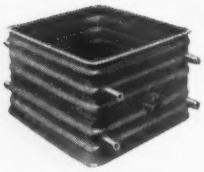
We think you'll like THE GOODYEAR TELEVISION PLAYHOUSE—every other Sunday—NBC TV Network



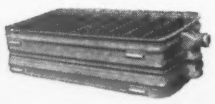
Model OM-2



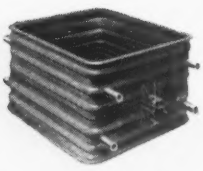
Model CH-20



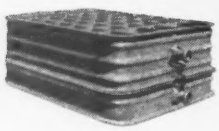
Model TM-10



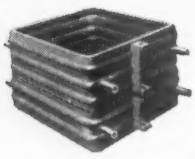
Model CH-30



Model TM-11



Model CH-40



Model TM-12

Republic Steel Foundry Flasks

Each Republic Flask is designed and built to meet the needs of the individual job . . . built to give long and economical performance.

Republic Flasks feature these advantages to help speed production in your plant: flask walls are of proper thickness . . . flanges are correctly placed . . . ribs and flanges extend full depth around the entire flask . . . every cope, drag and check is one integral piece of tough steel . . . there are no built-up sections to jar loose.

Write for illustrated literature on the complete line of Republic Steel Foundry Flasks.

now... specify **Republic**

STEEL FOUNDRY FLASKS
STEEL BOXES and SKIDS

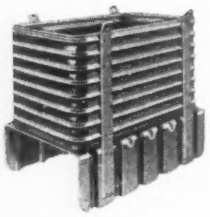
Republic Steel Boxes and Skids

Preferred throughout industry, Republic Steel Boxes and Skid Platforms help speed movement of materials . . . simplify storage of materials... produce savings in all phases of materials handling.

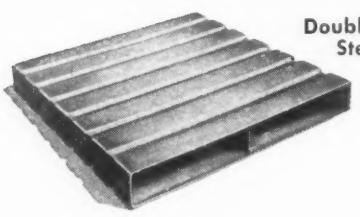
Republic Steel Boxes and Skids are fabricated from heavy gauge steel sheets. They feature deep reinforcing ribs, designed to give maximum strength and rigidity. Manufactured in a wide range of sizes, Republic Boxes and Skids are available for use with trucks, crane or hand-operated units.

Specify "Republic" when you want the best in Steel Boxes and Skids. Write for illustrated catalog describing the complete line.

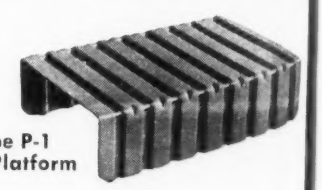
Type PB-120



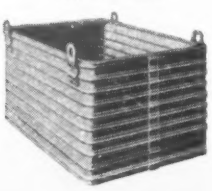
Type PB-120-L



Double-face Steel Pallet



Type P-1 Skid Platform



Type B-80C

REPUBLIC STEEL

PRESSED STEEL DIVISION
REPUBLIC STEEL CORPORATION
6208 TRUSCON AVENUE • CLEVELAND 27, OHIO

A BONDING CLAY THAT'S AIRFLOATED

AVAILABLE ALL YEAR

ARTIFICIALLY DRIED

LOW MOISTURE

PRODUCED IN THE SOUTHERN OHIO AREA BY CLAY MEN WITH 28 YEARS EXPERIENCE BEHIND THEM

200 MESH

Here's a bonding clay that's almost as light and fine as flour — possibly the finest bonding clay available anywhere. Mined from our own pits, artificially dried, and ground to velvet dust, it has found favor with discriminating foundrymen everywhere. Moreover, it is available at any time of the year, all year long—and it keeps its high qualities. While it is a very superior clay for bonding sand, it has many other foundry uses. A foundryman doesn't have to think very long before he can find dozens of applications for this velvet-fine AIRFLOATED CLAY. We can ship it anywhere in a hurry: just tell us about your schedules, and we'll do the rest.

Write today for your free sample

CEDAR HEIGHTS CLAY CO.

50 PORTSMOUTH ROAD
OAK HILL, OHIO

For Uniform, Low Cost, Efficient Blast Cleaning

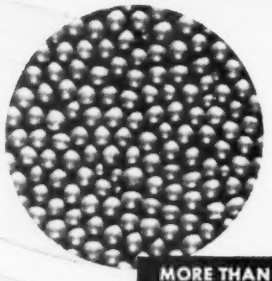
METALLIC

SHOT **HI-GRADE** GRIT

When you buy shot and grit, you buy a promise of uniform, low cost, efficient blast cleaning or peening. Your confidence in the material ordered should be based on actual use, rather than recommendation or reputation. Its true value to you can only be determined by a thorough test in your equipment, on your job.

To all outward appearances, most shot and grit may appear to be the same—but, that's where the similarity ends. Where Hi-Grade Shot and Grit are concerned, you'll find there IS a difference . . . a value far beyond purchase price that pays out in extra performance on *your* job. Hi-Grade Shot and Grit is *quality-controlled* from molten metal to finished product. Order a trial quantity today. Let results convince you *Hi-Grade is best by test.* That's the only practical and profitable way to buy abrasives.

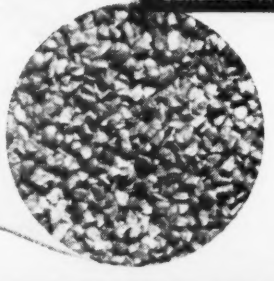
PACKED IN 100 LB. BAGS
READY FOR IMMEDIATE SHIPMENT



HI-GRADE SHOT
UNIFORM SIZE AND HARDNESS

Withstands repeated strain, stress and wear. Famous for its lack of hollows, tails, irregular shapes. Exclusive alloying and tempering process helps prevent rust; minimizes impact fractures.

MORE THAN MEETS S.A.E. SPECIFICATIONS
SCREENED AND GRADED FOR 100% USAGE



HI-GRADE GRIT
SHARP, TOUGH AND DURABLE

Made of same material and processed by same methods as Hi-Grade Shot. Free from dust fines and scale. Cleans with maximum efficiency. Easy on equipment—reduces wear and maintenance costs.

Clayton-Sherman *Abrasives Company*

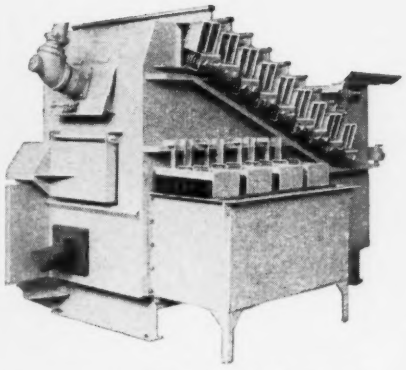
MANUFACTURERS OF *QUALITY-CONTROLLED* SHOT AND GRIT

Representatives in Principal Cities

3896 LONYO ROAD ★ DETROIT 10, MICHIGAN

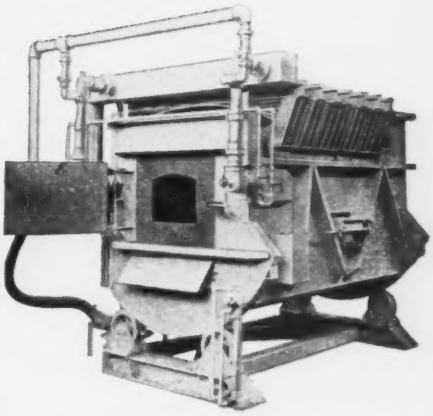
ALUMINUM

These Stroman Built Furnaces are designed for production of unsurpassed quality metal in the fastest, most efficient and economical manner. Built for all purposes and capacities they meet the demands of the sand foundries, die casters, permanent mold plants and smelters. They are recognized as the finest in the industry and reduce costs and make working conditions most agreeable. All furnaces may be fired by oil or gas.



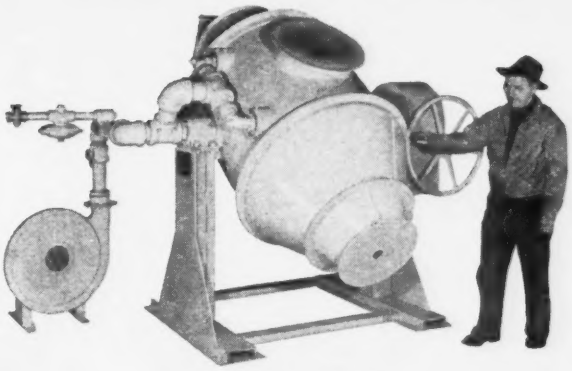
MODEL "MC" DIP-OUT TYPE

For melting and holding all in the same furnace. Hot metal always available. No iron pots or crucibles to replace. Capacities from 500 to 5000 pounds aluminum.



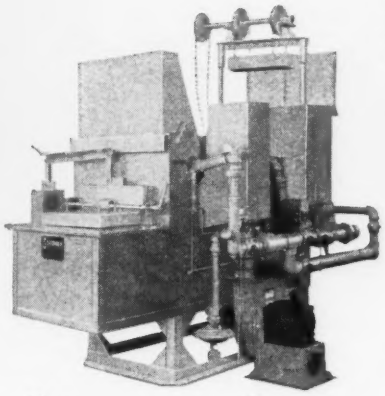
MODEL "SW"—TILTING TYPE

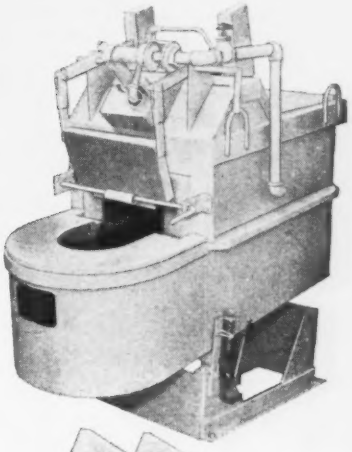
Excellent to run back returns along with ingot required for permanent mold, die or sand casting operations. Also an ideal breakdown furnace. Capacities—600-1000-1700-3000 lbs. Aluminum.

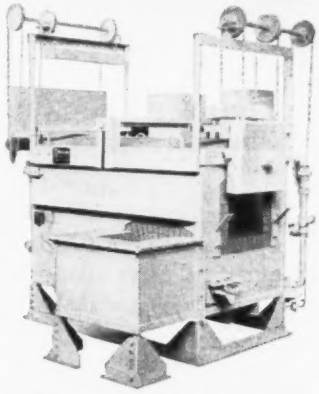


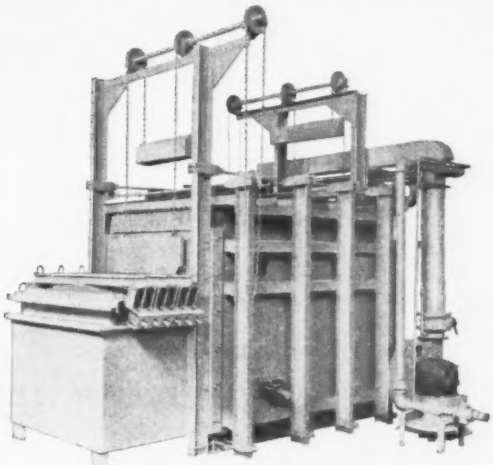
MODEL "BFC"

Hand tilt, open flame, barrel type furnace with flames firing tangent to inside of lining. Very fast melting. Used in all type plants including smelters. Capacities—500 lbs. Aluminum. A must for all aluminum jobbing sand foundries.



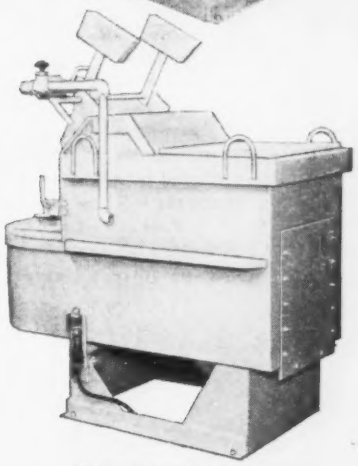






SMELTERS FURNACE

Built especially for smelters and other large melters. Easy charging, drossing, fluxing and alloying. Can be built to your own specifications. Capacities from 3000 lbs. Aluminum up.



MODEL "DSC" DIE CASTING FURNACE

A small reverberatory furnace for melting and holding, or for holding only when hot charged at the die casting machine. Made in various sizes to meet your requirements.

MODEL "DC" FURNACE

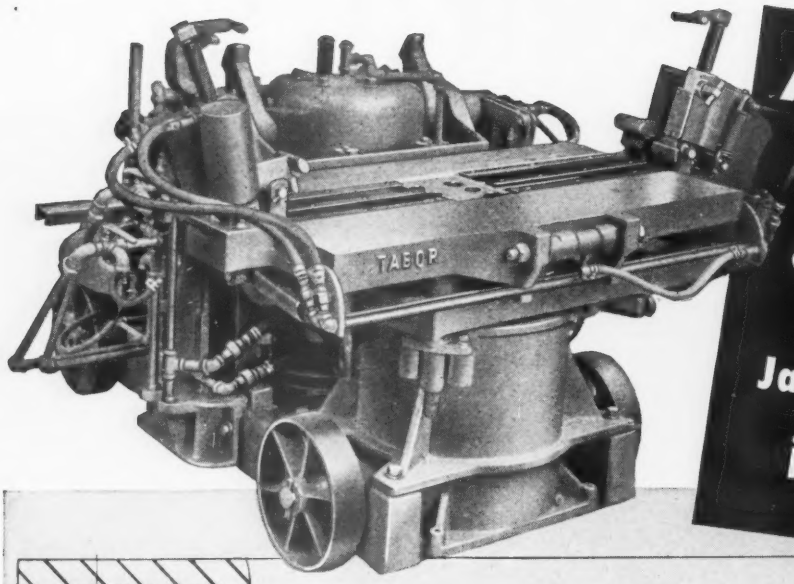
The 2 in 1 furnace. Breakdown and Holding in the same unit. Cold metal never reaches the molten bath. Assures metal of the finest quality on all classes of work. Close temperature control. Can be used as a sweat furnace for reclaiming inserts. Ideal for all types of plants including sand, permanent mold and die casting. Capacities from 350 lbs. Aluminum up.

STROMAN ALSO BUILDS FURNACES FOR THE MELTING OF BRASS, BRONZE, MAGNESIUM, IRON, ETC., ALSO CORE OVENS. WRITE TODAY FOR NEW CATALOGUE NO. 800.

STROMAN FURNACE & ENGINEERING CO.

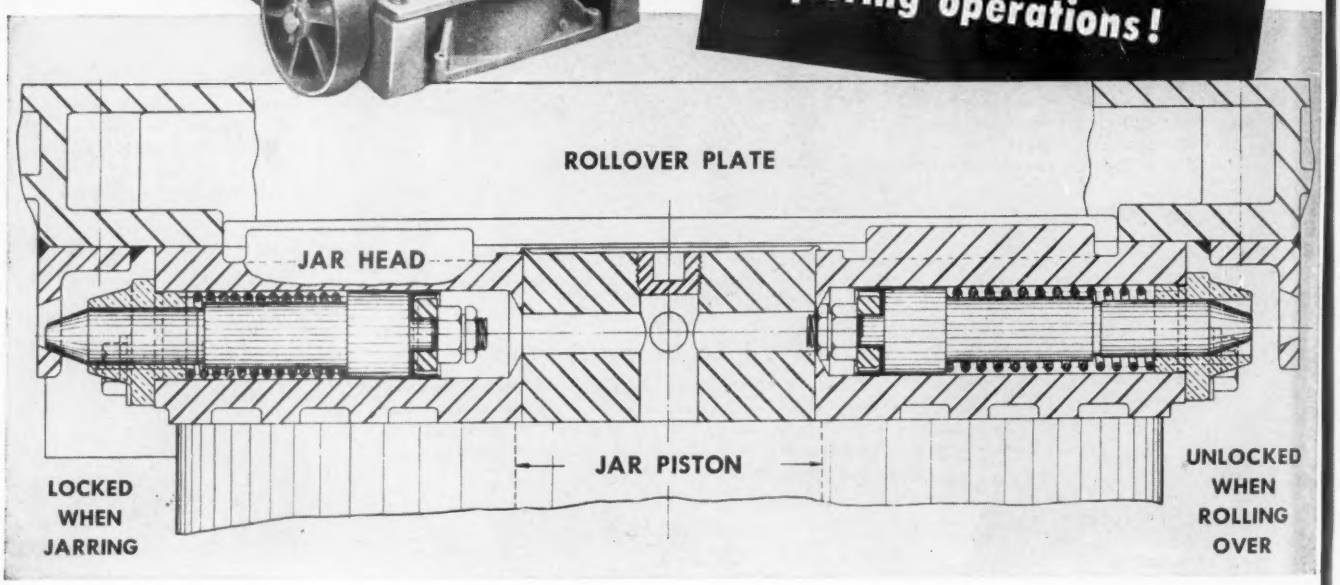
DIVISION OF

THE PETERSEN OVEN CO. • 9900 FRANKLIN AVE. • FRANKLIN PARK, ILL.



ANOTHER TABOR FIRST...

Rollover Plate and Jar Head locked during jarring operations!



ROLLOVER PLATE—JAR HEAD LOCKING DESIGN

The above sectional drawing illustrates Tabor's new locking arrangement. Jarring air pressure automatically throws rugged pins into seats under the rollover plate. Pins retract under spring tension when jarring valve is closed.

HERE'S a feature never before offered in jar, power rollover, power draw machines. New Tabor construction locks rollover plate and jarring mechanism *into one rigid assembly* the moment jarring air is introduced.

This gives you *four* distinct advantages:

(1) Effectiveness of jarring blow is increased 25%.

(2) Ramming effect is equalized *all over the mold.*

(3) Does away with unwanted "secondary jolt" between plate and jar head—adds greatly to life of both members.

(4) Eliminates all plate wobble, even when handling a mold with uneven weight distribution.

Always big producers, Tabor Rollovers also feature the new quick-change-over table which permits *independent* setting of all four clamps—a table design which is invaluable in either core room or jobbing shop where pattern changes are frequent.

Get full details. Write, wire, or phone today.

REPRESENTATIVES
Snyder Foundry Supply Company, Los Angeles, Calif.; The Pacific Graphite Company, Inc., 40th & Linden Sts., Oakland 8, Calif.; Carl F. Miller & Company, Seattle, Washington; Harry H. Reich, Trussville, Ala.

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

The **TABOR** *Manufacturing Co.*

SINCE 1884 MANUFACTURERS OF FOUNDRY MOLDING MACHINES
6225 TACONY STREET • PHILADELPHIA 35, PENNA.

EXPORT DEPARTMENT, 765 DREXEL BLDG., PHILA. 6, PA

"We cut fuel costs in half!"

ANOTHER B&W MONEY-SAVING RECOMMENDATION

CONTROL DATA

LINING	MAX. FUEL CONSUMPTION	CONTROL
Ordinary Firebrick	1,000,000 BTU/HR	100 to 150F Overshoot of Critical Pouring Temp.
B&W Insulating Firebrick	500,000 BTU/HR	No Overshoot of Critical Pouring Temp.

THE CHART ABOVE shows how B&W Insulating Firebrick slashed fuel bills by 50% and provided close temperature control when a B&W field engineer recommended its use in place of ordinary firebrick in a crucible type furnace melting magnesium. Similar savings were also made on identical units melting aluminum when lined with B&W Insulating Firebrick.

The reason for this superior performance is that lightweight B&W Insulating Firebrick store and conduct less heat, thus provide faster heating up time and lower fuel consumption. These brick also respond rapidly to changes in heat input, assuring excellent temperature control.

KAOCAST FLOOR TAKES PUNISHMENT

In this same furnace, a durable B&W Kaocast floor withstood the spillage of crucibles . . . eliminated the need to renew the floor every time a crucible was replaced.

Your B&W Refractories Engineer can help you lower production costs because he is backed by three decades of refractories experience. B&W has designed money-saving refractories for virtually every kind of high-temperature furnace, oven, kiln, lehr and tank. Ask him to recommend a *specialized* B&W refractory to meet your requirements.

BABCOCK & WILCOX

THE BABCOCK & WILCOX CO.
REFRACTORIES DIVISION
GENERAL OFFICES: 161 EAST 42ND ST., NEW YORK 17, N.Y.
WORKS: AUGUSTA, GA.

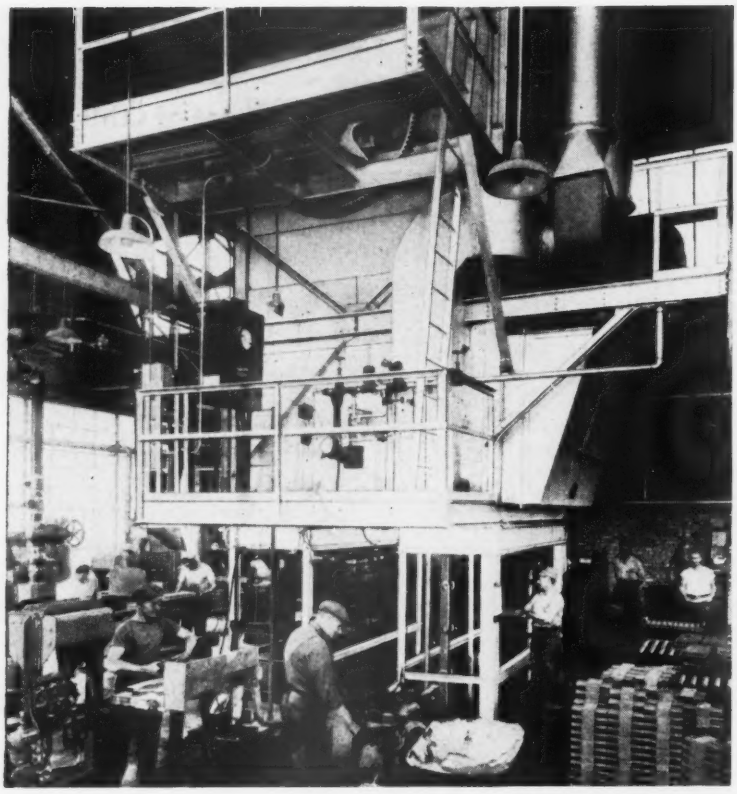
R-384

B&W REFRACTORIES PRODUCTS — B&W Allmul Firebrick • B&W 80 Firebrick • B&W Junior Firebrick • B&W Insulating Firebrick B&W Refractory Castables, Plastics and Mortars • OTHER B&W PRODUCTS — Stationary & Marine Boilers and Component Equipment... Chemical Recovery Units . . . Seamless & Welded Tubes . . . Pulverizers . . . Fuel Burning Equipment . . . Pressure Vessels . . . Alloy Castings

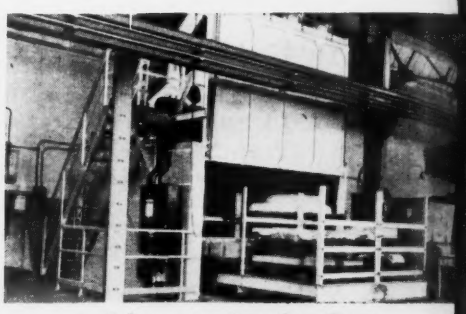
Repeat orders for

COLEMAN OVENS

prove outstanding performance

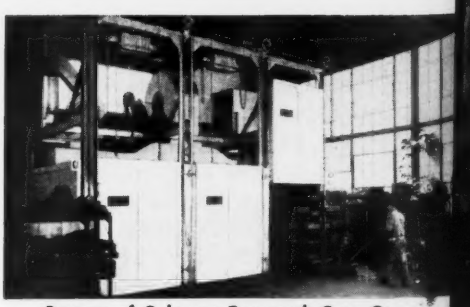


Coleman Tower Oven at Wells Manufacturing Co.



Coleman Car-Type Core Ovens
at Pettibone-Mulliken Co.

Coleman Car-Type Mold Oven
at The Bullard Co.



Battery of Coleman Transrack Core Ovens
at The Crucible Steel Castings Co.

You should get all the facts concerning the core and mold ovens you expect to install... because the right ovens will increase your production and your profits. Over 80% of Coleman Ovens are "repeat orders" from past customers... proving performance to *complete satisfaction.* Coleman Ovens are the choice of leading firms in every branch of the foundry industry from small shops to large production foundries. You get over 50 years of know-how and experience in every Coleman Oven, so why gamble with inferior designs? Coleman Ovens of proved performance cost no more... and pay for themselves quickly out of savings in fuel, labor and increased production. Get the facts today...

WRITE FOR BULLETIN C

A COMPLETE RANGE OF TYPES AND SIZES
for every core baking and mold drying requirement:

Tower Ovens
•
Horizontal Conveyor Ovens
•
Car-Type Ovens
•
Transrack Ovens
•
Rolling Drawer Ovens
•
Portable Core Ovens
•
Portable Mold Dryers

THE FOUNDRY EQUIPMENT COMPANY
1831 COLUMBUS ROAD CLEVELAND 13, OHIO

● *world's oldest and largest foundry oven specialists*

telling the story of 'dag' dispersions

Does This Parting Compound Have Special Properties You Need?...

'dag' Colloidal Graphite—Forms tenacious *dry lubricating film* that is micronically thin, exceptionally slippery. Prevents sticking, speeds parting, assures smooth castings.

Easily applied by spraying, painting, or dipping. Improves shop conditions by eliminating irritating smoke caused by most parting compounds. Cuts down formation of gas-pockets.

For Chills—'Aquadag', a dispersion of colloidal graphite in water, assures good parting, increases cooling effect of the chill. . . . **For Permanent Molds**—Colloidal graphite application increases mold life, assures superior reproduction of castings. . . . **For Cores** — Coating obtained with 'Aquadag' helps parting and chilling. Film is so thin that there is no build-up. . . . **For Shoulder Screws**—'Oildag', a concentrated dispersion of colloidal graphite in oil, eliminates all carbon formation, assures free movement of parts at all times. . . . **In Other Applications**—For cavities, gates, runners, risers, base plates, patterns, flask pins, push pins . . . generally wherever a superior parting compound is required. Learn more about **'dag'** dispersions for foundry operations. Write *today* for Bulletin No. 425-14G.

Dispersions of molybdenum disulfide are available in various carriers. We are also equipped to do custom dispersing of solids in a wide variety of vehicles.

Acheson Colloids Company

Port Huron, Michigan

...also ACHESON COLLOIDS LIMITED, LONDON, ENGLAND

Units of Acheson Industries, Inc.

try 'dag' resin-bonded dry films for permanent lubrication

dag DISPERSIONS

This recent Schneible Multi-Wash installation is typical of many such systems that are today helping management get that extra worker incentive necessary to produce more and better castings. A noticeable lift to output and employee relations has been the result of providing clean, healthful surroundings through efficient control of foundry fumes and dirt.

These 10 Multi-Wash units, having a total of 130 washing stages, remove the dirt from 350,000 cfm of air every minute. Water, at the rate of 1500 gallons per minute, is recirculated through the system to remove and convey the collected material to a central disposal tank, which also serves 40 other Multi-Wash units.

Schneible patents cover all features that make Multi-Wash the only dust collector using the wet method principle, that provides multiple washing action and an efficiency rating of 99.9%, by actual scientific tests.

PRODUCTS:
Water Curtain Cupola Collectors
Multi-Wash Collectors • Uni-Flo
Standard Hoods • Uni-Flo
Compensating Hoods • Uni-Flo
Fractionating Hoods • Ductwork •
Velocitrap • Dust Separators •
"Wear Proof" Centrifugal Slurry
Pumps • Settling and Dewatering
Tanks • Entrainment Separators

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

CLAUDE B. SCHNEIBLE COMPANY
P. O. Box 81, North End Station
Detroit 2, Michigan

ENGINEERING REPRESENTATIVES IN PRINCIPAL CITIES

SCHNEIBLE

Late Foundry News

JUNE 26, 1953

FOUNDRY RECOGNITION: A ferrous foundryman will be added to the Iron and Steel Products Industry Advisory Committee of NPA's Iron and Steel Division. The authorization, by the Metals and Minerals Bureau of NPA, is in response to recommendations from trade associations representing gray iron, steel and malleable iron castings producers.

This will give the ferrous foundry industry representation at the highest level in the formulation of priority, production and other controls that might be necessary in event of another full mobilization, as well as in the limited control period to start this July 1. The foundry industry will be asked to agree on a man to represent it on the advisory committee.

CERTIFICATES OF NECESSITY: A $3,321,100 plant to be built at Calera, Ala., by American Brake Shoe Co. for producing cast steel car wheels is represented in the largest of recent certificates granted by the Office of Defense Mobilization for rapid tax writeoff of new or expanded foundry facilities.

Other approved foundry projects and amounts involved include: Janney Cylinder Co., Philadelphia, $48,223; Bethlehem Steel Co., $500,000; Sinking Spring Foundry Co., Sinking Spring, Pa., $161,350; Eastern Malleable Iron Co., Wilmington, Del., $60,000; Grede Foundries Inc., Milwaukee, $28,700. Depreciation of 65 per cent of each of these amounts at the accelerated rate is allowed.

LEAVES AFS: S. C. Massari has resigned as techical director, American Foundrymen's Society, to become general manager, Foundry Division, Hansell-Elcock Co., Chicago. Hans J. Heine, formerly chief metallurgist, Barberton Division, Rockwell Mfg. Co., Barberton, O., has been appointed assistant technical director of the AFS and will function as acting director.

FALCON LIQUIDATING: Falcon Bronze Co., Youngstown, O., a major producer of brass and bronze castings, has decided to go out of business. The foundry's equipment has been sold to American Brake Shoe Co. and will be moved to the latter's plants. Falcon, a 58-year-old concern, has experienced labor troubles the last three months.

EQUIPMENT EXPANSION: Increased capacity for the production of various types of metalworking equipment has been decided on by the ODM. A revised expansion goal for miscellaneous metalworking equipment has been set at $46,760,000 of capital investment in added production capacity, an increase of $6,760,000 over the previous goal. This classification includes foundry equipment and supplies.

LESS SCARCITY: Few items remain on NPA's list of what it terms "scarce materials." Fifty-seven materials have been deleted from the list issued four months ago, leaving only diamond grinding wheels, chromium, cobalt, columbium-tantalum, molybdenum and nickel. Even in nickel one NPA official recently said he believes "we have turned the corner" leading to a fuller supply.

GOVERNMENT LEASE: Pacific Northwest Alloys Inc., Spokane, has leased a major portion of the government-owned magnesium plant at Spokane to make ferroalloys. To run for 10 years, with options to renew for two more 5-year periods, the lease provides that the company will pay a minimum rental of $158,000 a year for the leased portion, plus 3 per cent on gross sales up to $18,000,000 and 2 per cent on gross sales over that figure. The entire facility can be reconverted for magnesium production on short notice. Pacific Northwest, which operated the plant for the government, is a subsidiary of Chromium Mining & Smelting Corp., Chicago.

PERSONALS: R. V. Righter, plant manager, Saginaw Malleable Iron Plant, Central Foundry Division, General Motors Corp., has been made manager of the division's Danville (Ill.) Plant. He is succeeded by L. F. Corp, formerly manufacturing superintendent at Saginaw . . . Harold F. Falk has been made executive vice president and Louis W. Falk is new vice president-manufacturing of the Falk Corp., Milwaukee .

FEWER REPORTS: Effective June 30, the monthly report on production of castings that has been required of foundries is needed on only a quarterly basis and covers only A through E shipments. NPA is considering combining the form on which this report is made with another, on shipments of and unfilled orders for ferrous castings.

ALUMINUM IMPORTS: Aluminum Co. of America and Kaiser Aluminum & Chemical Sales Co. will be supplied with a total of 786,000 tons of primary aluminum over the period of 1953 through 1958 by Aluminum Import Corp., U. S.

distributing subsidiary of Aluminum Ltd. Of the total, 600,000 tons will go to Alcoa and 186,000 tons to Kaiser. Practically all the metal to fill the contracts will be supplied by Aluminum Co. of Canada, a subsidiary of Aluminum Ltd. The aluminum is being made available for the United States through the co-operation of the United Kingdom government, which relinquished 176,000 tons for which it had contracted, and through possible acceleration of the smelter expansion program at Kitimate, British Columbia.

PURCHASE NICKEL: A total of 120 million pounds of metallic nickel and 100 million pounds of electrolytic copper have been purchased by the U. S. government from International Nickel Co. of Canada Ltd. The contract provides that deliveries will start in December at the rate of 2 million pounds per month for metallic nickel and 1,666,666 pounds per month for electrolytic copper. Deliveries are scheduled to be completed in 1958. International Nickel says the deliveries will not require diversion of nickel currently being supplied to the nickel trade from the company's regular production.

REMOVE CONTROLS: All remaining controls over eight alloying materials were removed June 15 by NPA. The materials are boron, calcium, manganese, silicon, titanium (as an alloying material), tungsten, vanadium and zirconium. Inventory limitations on boron, calcium, ferromanganese and ferrosilicon were eliminated by NPA in a previous amendment.

MISCELLANY: Electro Metallurgical Co. has set a new base price of 13.15c per lb of contained manganese, f.o.b. shipping point, for standard ferromanganese containing 76 to 80 per cent manganese. This is a small increase over former prices . . . Chicago Foundrymen's Association and the AFL averted a strike set for June 8 at 60 foundries by agreeing to a 7½ per cent pay boost. The new scale ranges from $1.62 to $2.12 an hour . . . The Worcester, Mass., tornado did over $1 million damage to Norton Co.'s new $6 million grinding machine plant . . . Malleable Iron Range Co., Beaver Dam, Wis., recently was honored by the Chicago Ordnance District at ceremonies marking the millionth 105-mm shell produced by the company since outbreak of the Korean war.

PRICES OF FOUNDRY METALS AND COKE

(As of June 26, 1953)

FOUNDRY COKE

(Per net ton, f.o.b. ovens)

BEEHIVE

Connellsville	$16.50-17.00
New River	20.80
Wise County	15.95

OVEN

Birmingham	$21.65
Chicago	24.50
Detroit	25.50
Erie, Pa.	25.00
Everett, Mass.	26.00
Indianapolis	24.25
Kearney, N. J.	24.00
Milwaukee	25.25
New Haven, Conn.	23.45
Painesville, O.	25.50
Philadelphia	23.95
Portsmouth, O.	24.00
St. Louis	26.00
St. Paul	23.75
Swedeland, Pa.	23.85
Terre Haute, Ind.	24.05

PIG IRON

(Per gross ton f.o.b. furnace)

	No. 2 Foundry	Malleable
Bethlehem, Pa.	$57.00	$57.50
Birmingham	51.38	....
Buffalo	55.00	55.50
Chicago	55.00	55.00
Cleveland	55.00	55.00
Everett, Mass.	59.50	60.00
Fontana, Calif.	61.00	....
Geneva, Utah	55.00	....
Granite City, Ill.	56.90	57.40
Lone Star, Tex.	51.00	51.00
Neville Island (Pittsburgh)	55.00	55.00
Steelton, Pa.	57.00	57.50
Swedeland, Pa.	59.00	59.50
Toledo, O.	55.00	55.00
Troy, N. Y.	57.00	57.50
Youngstown, O.	55.00	55.00

NONFERROUS INGOT

BRASS AND BRONZE: 85-5-5-5 —26.00c; 88-10-2—34.75c; 80-10-10 — 30.00c; No. 1 yellow — 21.25c.

ALUMINUM: 99 per cent plus, primary ingots 20.50c. Secondary No. 12 alloy 22.00-22.50c. Deoxidizing grades: No. 1 23.00-23.25c; No. 4 20.50-21.00c.

MAGNESIUM: 99.8 per cent standard ingots 27.00c, f.o.b. Freeport, Tex.

COPPER: Electrolytic 29.75-30.00c, Connecticut valley.

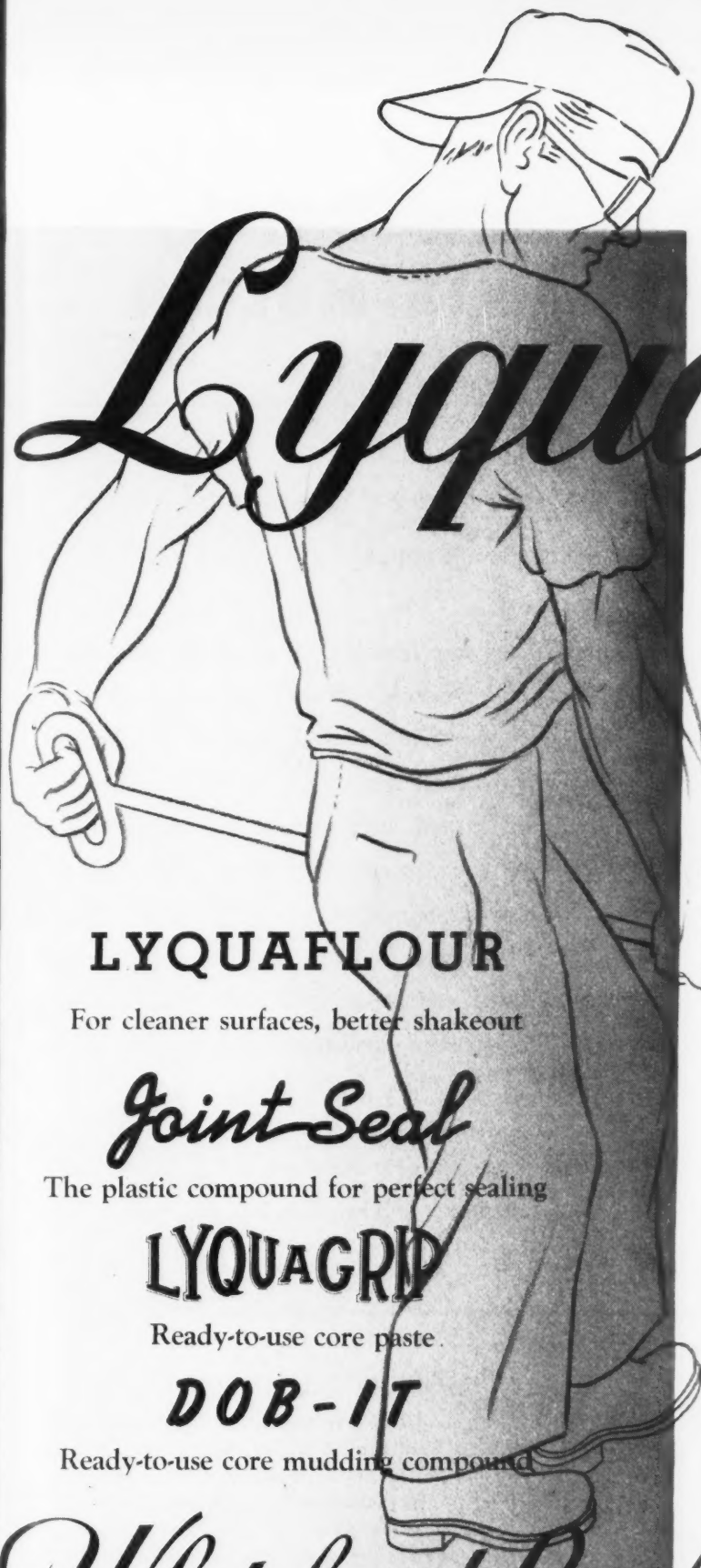
ZINC: High grade 12.35c, delivered. Die casting alloy 15.50c, delivered.

IRON AND STEEL SCRAP

(Consumer prices per gross ton delivered, except as otherwise noted)

	No. 1 Heavy Melting Steel	No. 1 Cupola Cast	Heavy Breakable Cast	Clean Auto Cast	Machinery Cast	Malleable	Short Steel Rails
Birmingham	$31.00-32.00	**$39.00-40.00	**$30.00-31.00	.....	.....	.....	45.00-46.00
Boston*	**30.00-31.00	**30.00-31.00	.....	.....	**38.00-39.00	.....	.....
Buffalo	40.50-41.00	**37.00-37.50	.....	.....	42.00-45.00	.....	51.75-52.75
Chicago	37.00-38.00	38.00-40.00	.....	40.00-42.00	42.00-43.00	39.00-41.00	50.00-51.00
Cincinnati	41.00	43.00	**37.00	38.00	48.00	45.00	53.00
Cleveland	43.00-44.00	45.00-46.00	38.00-39.00	46.00-47.00	48.00-49.00	49.00-50.00	55.00-56.00
Detroit	33.00-34.00	43.00	29.00-30.00	42.00-43.00	.....	44.00	.....
Los Angeles	24.00	**40.00-43.00	.....	.....	.....	.....	.....
New York*	35.00-36.00	33.00-34.00	.....	.....	.....	.....	.....
Philadelphia	41.00-42.00	39.00	43.00	.....	47.00-48.00	.....	.....
Pittsburgh	42.00-43.00	42.00-43.00	39.00-40.00	.....	49.00-50.00	.....	53.00-54.00
St. Louis*	35.00-36.00	41.00-42.00	33.00-34.00	44.00	.....	36.00	53.00-54.00
San Francisco	28.00	38.00-39.00	45.00	52.00	52.00	45.00	45.00
Seattle	31.00	**40.00	**36.00-38.00	.....	.....	.....	.....

* Brokers' buying prices. ** F.o.b. shipping point.



Established 1851

Lyquaface

Famous Liquid Carbonaceous Sand Grain Coating

1. **LYQUAFACE** is easy to use.
2. **LYQUAFACE** sand is not critical.
3. **LYQUAFACE** sand won't blow.
4. **LYQUAFACE** sand reduces gaggers and nails.
5. **LYQUAFACE** sand improves with use.
6. **LYQUAFACE** allows casting in a carbon sheath.

7. **LYQUAFACE** provides hot strength.
8. **LYQUAFACE** provides tensile strength.
9. **LYQUAFACE** reduces casting weight.
10. **LYQUAFACE** improves finish.
11. **LYQUAFACE** reduces dust hazard.
12. **LYQUAFACE** reduces cleaning time.

You owe it to yourself to investigate our claims. — Send for detailed booklet.

LYQUAFLOUR

For cleaner surfaces, better shakeout

Joint-Seal

The plastic compound for perfect sealing

LYQUAGRIP

Ready-to-use core paste

DOB-IT

Ready-to-use core mudding compound

Whitehead Brothers Company

NEW YORK OFFICE
324 West 23rd St., New York 11, N. Y.

NEW ENGLAND OFFICE
17 Exchange Place, Providence 1, R. I.

Announcing

THE NEW SIMPSON LF MIX-MULLER

for accurate laboratory control of Foundry Sand

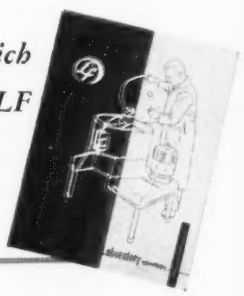
Quality sand for quality castings is a matter of careful control . . . and control starts in the laboratory! It is here that production quality and efficiency is checked and new standards and requirements are established . . . on precise, accurate laboratory equipment.

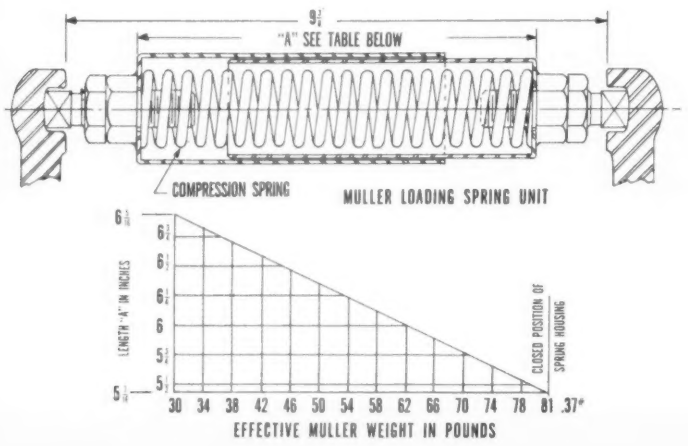
Such an instrument is the NEW Simpson LF laboratory size Mix-Muller. Built to the same exacting standards as larger Simpson Mix-Mullers, the new LF model provides a simple, accurate and projectionable working duplication of foundry sand for laboratory use.

Simpson Mix-Mullers offer the most thorough mulling action ever developed. The LF laboratory model operates with the same intensive smearing, kneading action as the larger Mix-Mullers and utilizes the same spring-loaded mullers that so greatly increases the efficiency of the mulling action. It is another outstanding *Product of a Practical Foundryman!*

Let National Engineering Company's experienced engineering staff help you improve sand control to produce quality castings.

Write for Bulletin 513, which describes the new Simpson LF laboratory size Mix-Muller.

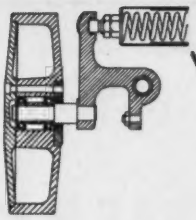




SPRING LOADING UNIT

To provide maximum flexibility of mulling action, Simpson LF Mix-Mullers are equipped with spring-loaded mullers. The comparatively light mullers may be adjusted to exert pressure from 30 to 80 lbs., thus adapting them to any type of sand to be conditioned.

The drawing and chart at the left shows the general arrangement of the spring-loading unit, and the effective muller pressure in pounds. The compression spring is shortened or lengthened by the adjusting screws, one on each side of the spring, to increase or reduce pressure. Adjustment is simple and fast.



SPRING-LOADED MULLERS

Lightweight mullers are designed to exert pressures from 30 to 80 pounds . . . simple adjustment quickly adapts pressure to type of sand being mulled. Further up and down adjustment can be made with rings on turret assembly.

ADDITIONS FUNNEL — DUST COVER

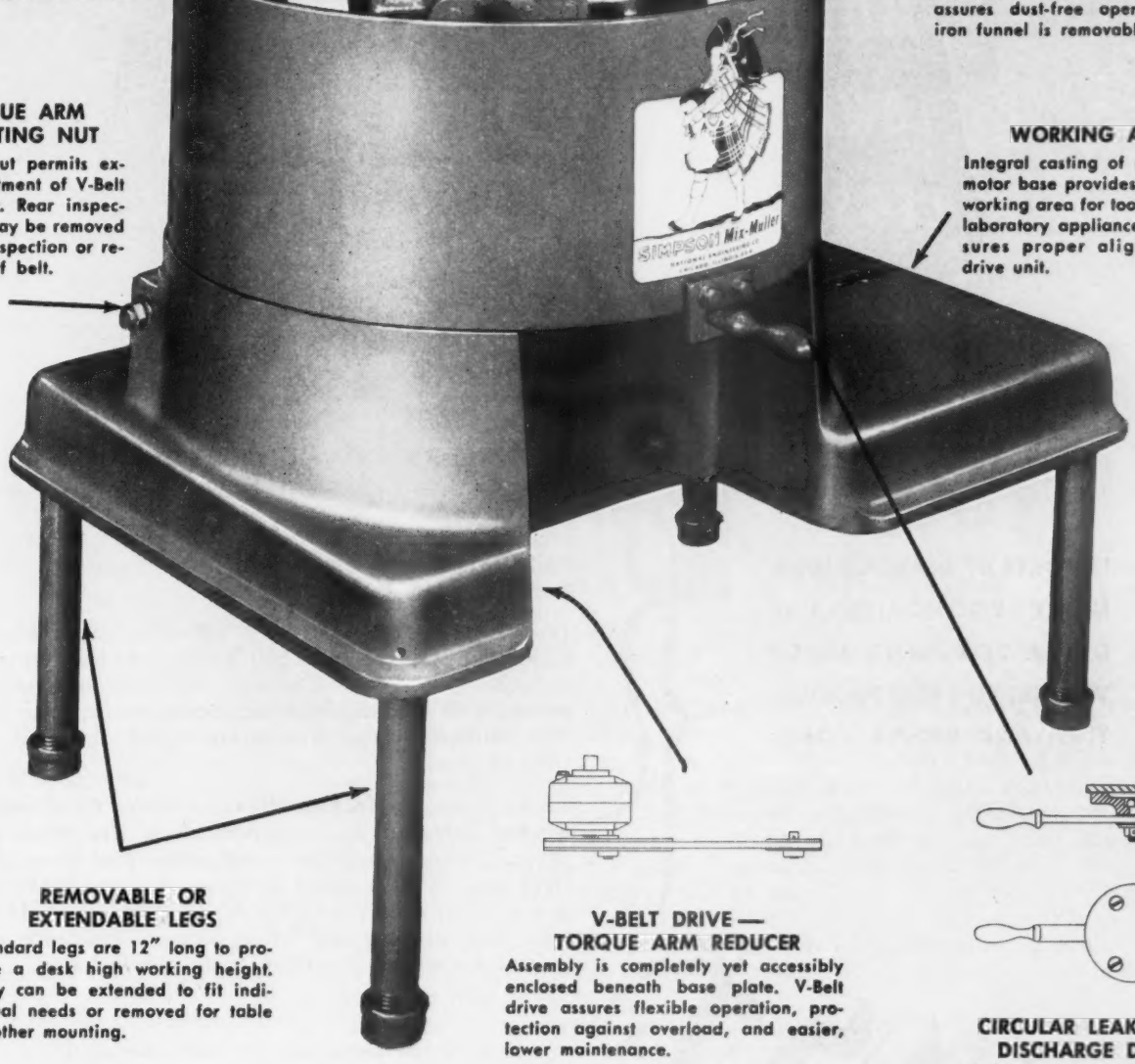
Liquid is added directly to the sand bed without removal of dust cover or splashing of liquids over rocker arms or mullers. Spun-metal cover is light, but sturdy . . . tight fit assures dust-free operation. Cast iron funnel is removable.

CRIB AND MULLER SCRAPERS

Designed for easy cleaning and no "build up" of material when in operation. Integral design of crib, turret and bedplate also provides quicker, easier cleaning.

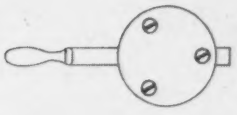
TORQUE ARM ADJUSTING NUT

Adjusting nut permits exterior adjustment of V-Belt by operator. Rear inspection plate may be removed for visual inspection or replacement of belt.



WORKING AREA

Integral casting of mixer and motor base provides adequate working area for tools or other laboratory appliances . . . assures proper alignment of drive unit.



REMOVABLE OR EXTENDABLE LEGS

Standard legs are 12" long to provide a desk high working height. They can be extended to fit individual needs or removed for table or other mounting.

V-BELT DRIVE — TORQUE ARM REDUCER

Assembly is completely yet accessibly enclosed beneath base plate. V-Belt drive assures flexible operation, protection against overload, and easier, lower maintenance.

CIRCULAR LEAKPROOF DISCHARGE DOOR

Quicker discharge of batch is provided by a circular discharge door that has been machined for a tight, leakproof fit and smooth operation.

National Engineering Company
(Not Inc.)
608 Machinery Hall Bldg. • Chicago 6, Illinois

NATIONAL SAND and MOLD HANDLING EQUIPMENT
NATIONAL SAND RECOVERY SYSTEM

SIMPSON *Intensive* MIX-MULLERS

DELTA
CORE AND MOLD WASHES

FOR...

MORE PERFECT CASTINGS

LOWER CLEANING ROOM COSTS

LESS SCRAP IN MACHINING

IMPORTANT REASONS WHY MORE FOUNDRIES USE DELTA CORE AND MOLD WASHES TO SPEED PRODUCTION AND REDUCE COSTS.

DELTA CORE AND MOLD WASHES *"Anchor" themselves by penetrating from 3 to 5 grains deep into the sand.* This bond between the wash and the sand . . . an exclusive DELTA feature . . . produces an expansion-resisting coating essential to the production of finer finished castings.

The dry compression strength increases with each degree rise in temperature up to 500°F when the hot compression strength takes over. *The hot compression strength* increases with each degree of temperature rise up to 2900°F. The ultimate hot compression strength in the mold reaches 1000 lb. p.s.i.

There is no gas leakage through Delta Core and Mold washed surfaces. Gases produced by decomposition of organic binders in the core sand cannot leak through Delta Core and Mold washed surfaces to contact the molten metal. Only DELTA CORE AND MOLD WASHES provide this unique and all-important insurance against defective castings resulting from gas leakage.

DELTA

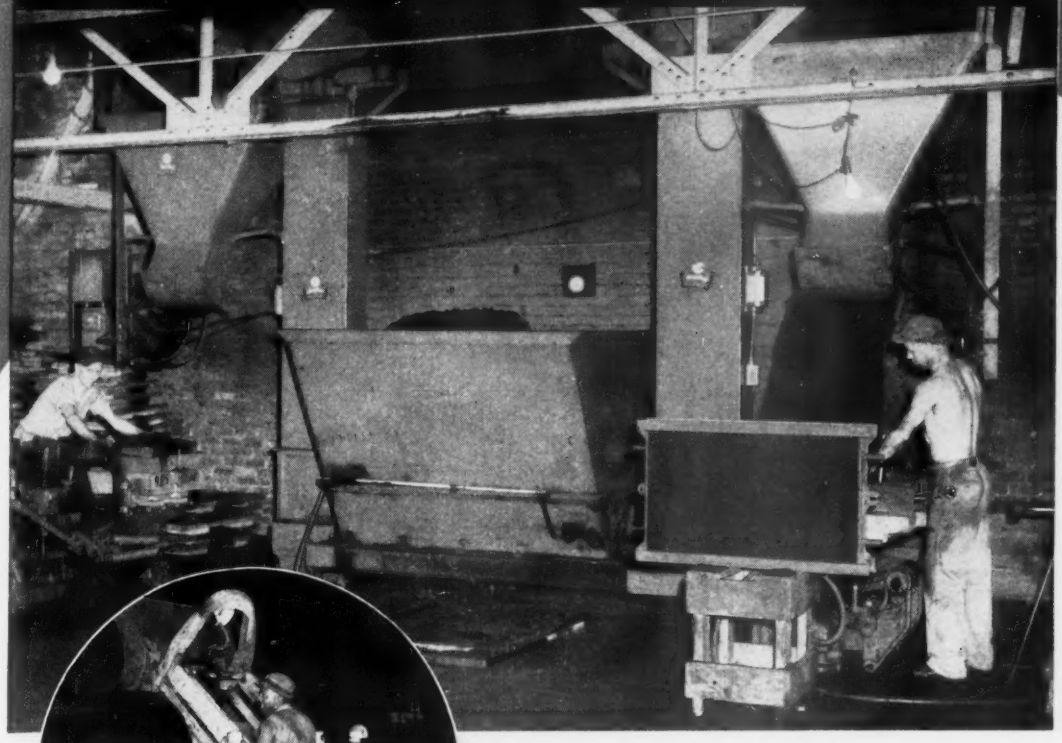
Working samples and complete literature on Delta Foundry Products will be sent to you on request for test purposes in your own foundry.

DELTA OIL PRODUCTS CO.

MANUFACTURERS OF SCIENTIFICALLY CONTROLLED FOUNDRY PRODUCTS

MILWAUKEE 9, WISCONSIN

"substantial production increase"



...results from use of

HANDY SANDY

on roll over work

PEERLESS FOUNDRY COMPANY, Cincinnati, Ohio, has reduced their cost per casting through use of the Handy Sandy to convert shoveling time into molding time. "The Handy Sandy's," says Stephan F. Dana, President, "have increased our production substantially which, of course, is important. However until we had these units there were certain jobs that required so much sand shoveling that it was injurious to the molders and they were constantly complaining. Since the installation of these units we do not have this difficulty and because the work is so much easier for the men the attendance records are a great deal better."

Both Handy Sandy Units are fed from a central hopper which is filled by a Payloader. They lift the sand overhead where it is available to the molders without bending or effort . . . enabling them to devote full time to molding.

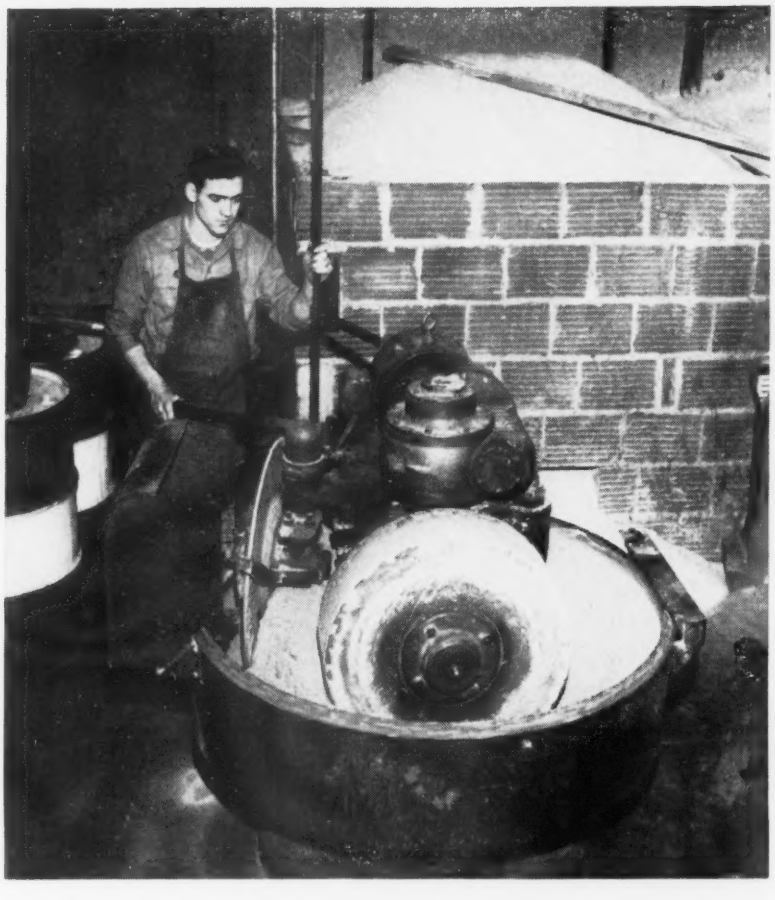
Because of the highly satisfactory performance of their Handy Sandy installation, Peerless Foundry has since ordered a second compound unit as shown above.

The advantages of the Handy Sandy are graphically described in a complete new catalog "PLANNED MECHANIZATION FOR FOUNDRIES." This 20-page manual shows how the Handy Sandy combines with the Reddy Sandy portable shakeout and sand preparing unit to eliminate all shoveling from the shakeout, sand preparing and molding cycle. SEND FOR YOUR FREE COPY TODAY.

NEWAYGO ENGINEERING COMPANY

NEWAYGO, MICHIGAN

Manufacturers of Neway® Mold Handling, Sand Handling and Conditioning Equipment



This No. 404 Clearfield Mixer has been in operation for eight years in the core shop of the Railway and Industrial Engineering Co. of Greensburg, Pa., makers of electrical switchgear for substations and generating stations. During that time it has required only very few minor repairs and "has paid for itself many times over."

in preparation of foundry sand

The

CLEARFIELD mixer

"Pays For Itself Many Times Over"

By its speed, its dependability, its flexibility—by the high quality sand it turns out—the Clearfield Mixer cuts costs and speeds production. In the unsolicited words of one of our satisfied customers "it pays for itself many times over."

Clearfield Mixers, featuring the famous revolving pan principle, are available in a wide range of sizes. There is a Clearfield Mixer to meet any sand preparation requirement you have, either as a single process or part of an integrated system.

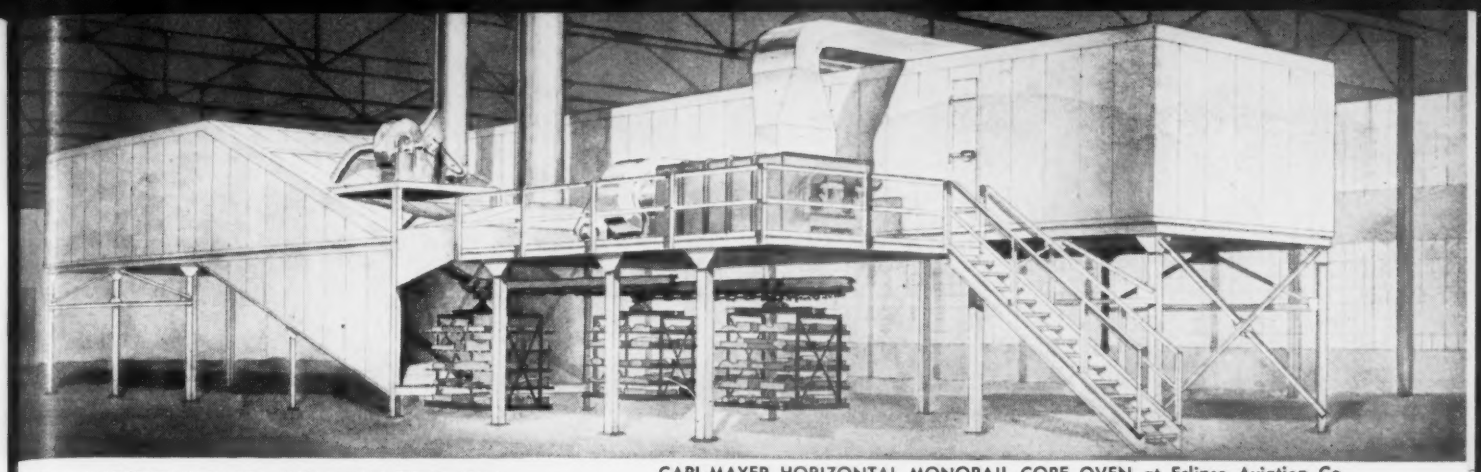
Write today for Catalog No. 83
for complete details.

CLEARFIELD
MIXER

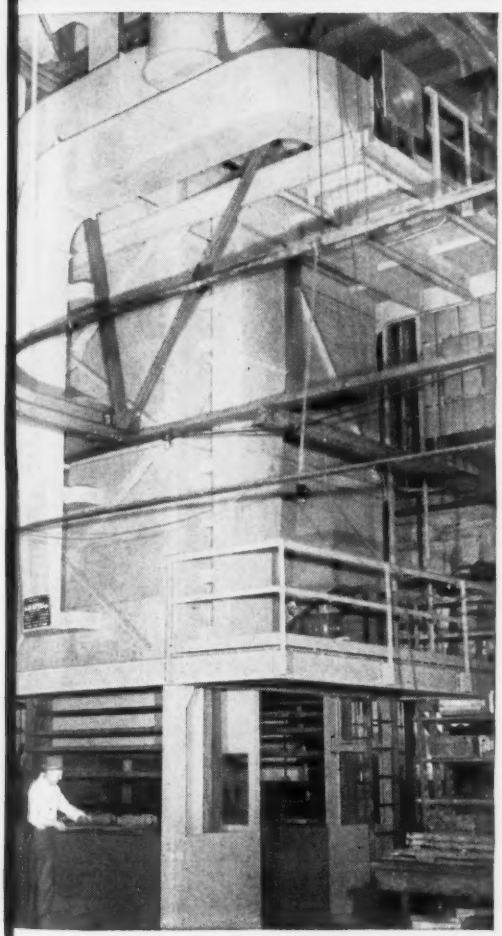
MIXES, TEMPERS
AERATES

CLEARFIELD
MACHINE COMPANY

CLEARFIELD
PENNSYLVANIA, U. S. A.



CARL-MAYER HORIZONTAL MONORAIL CORE OVEN at Eclipse Aviation Co.
Patent No. 2355814

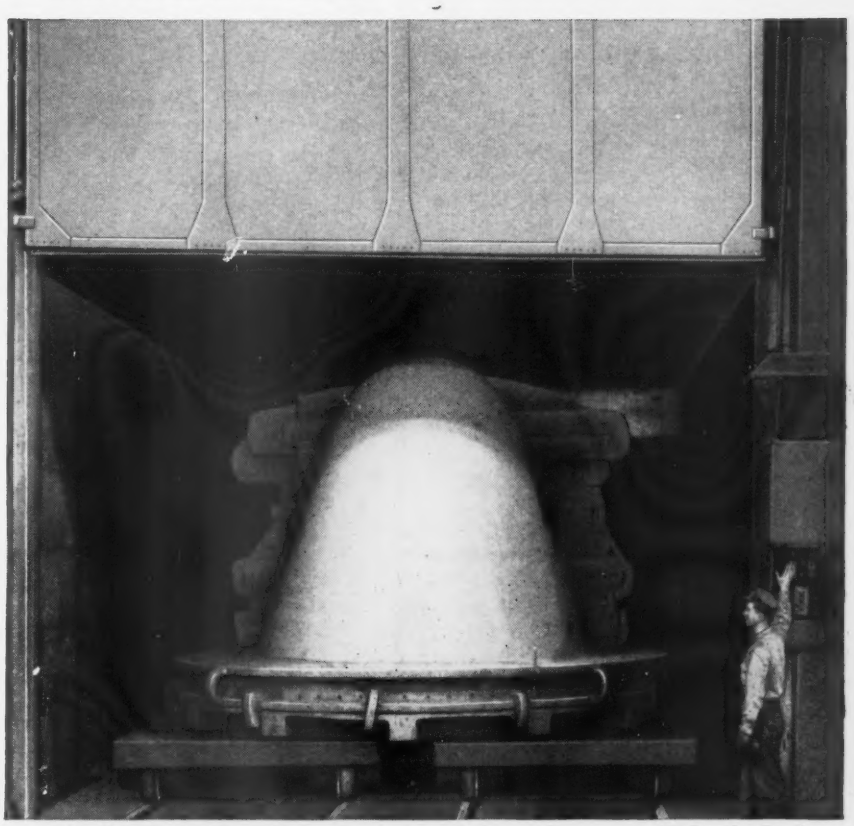


CARL-MAYER VERTICAL CORE OVEN
at G. & C. Foundry Company
Patent No. 2257180.

"BIG" Engineering brings big foundry oven jobs to CARL-MAYER

Carl-Mayer designs embody patented features which contribute to highest efficiency and economy in operation. It will pay you to consult us on your next core baking and mold drying problem. We build ovens of all types and sizes, also other types of industrial ovens and furnaces.

Write For Bulletin No. 53-CM.



CARL MAYER MOLD OVEN. One of a battery of two at Pittsburgh Steel Foundry Corp. Capacity: 100 tons per charge (each oven). PATENT APPLIED FOR.

ARL-MAYER CORE AND MOLD OVENS ARE SERVING CONCERNS LIKE THESE:

inum Co. of America
rican Brake Shoe Co.
rican Radiator Co.
-Knox Co.
n Industries
Motor Div. of General tors Corp.
us-Erie Co.
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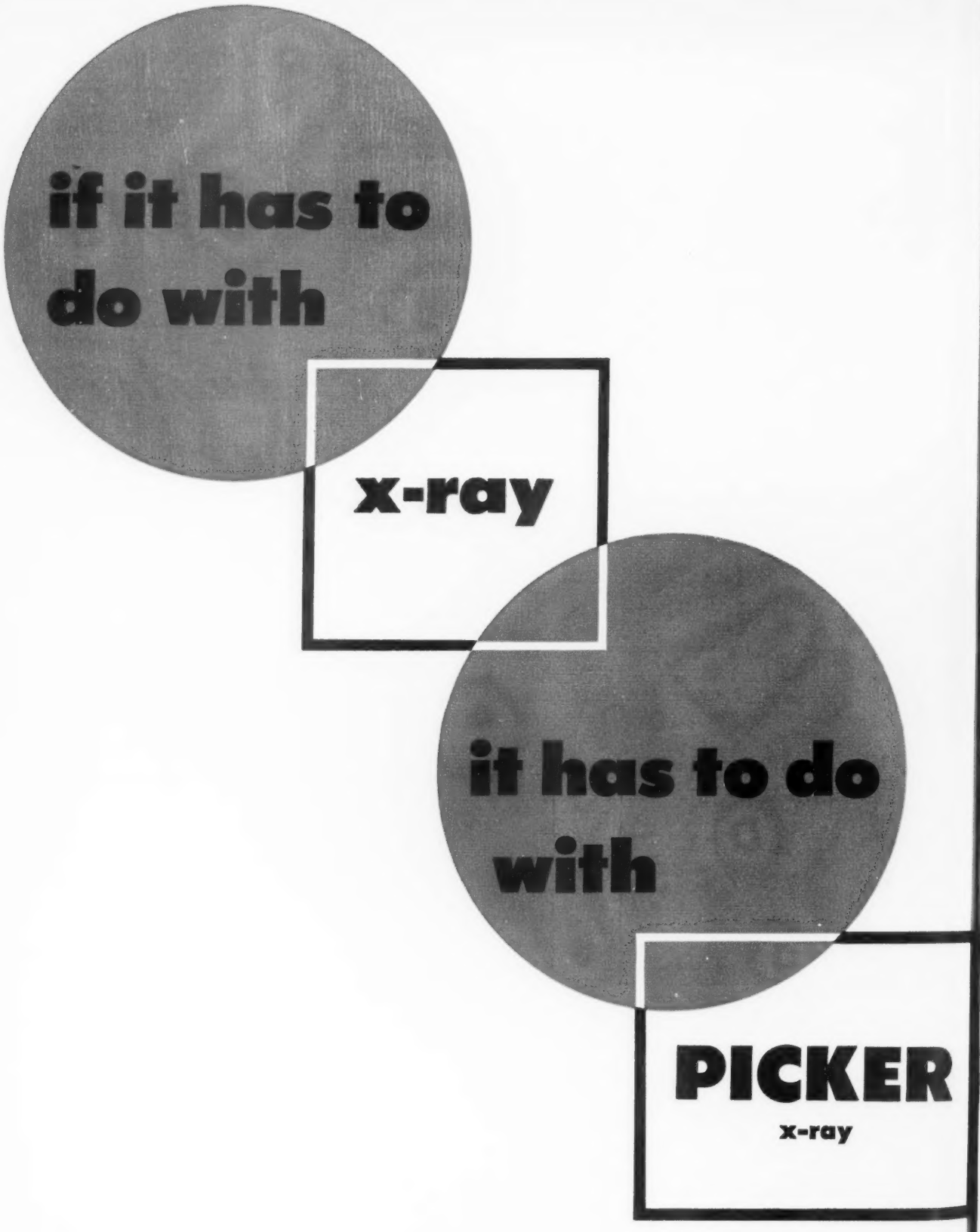
S. Steel Corp.)
ible Steel Castings Co.
rk Radiator Co.
se Aviation Division of dix Aviation Corp
ric Autolite Co.
Motor Co.
ost Foundry Co.
C. Foundry Co.
ral Electric Co.
ral Motors Corp. and bsidiaries
Gilbert & Barker Co.
General Steel Castings Co.
Golden Foundry Co., Inc.
Henry Kaiser Corp.
W. O. Larson Foundry Co.
Mesta Machine Co.
F. E. Meyers & Bro. Co.
Oil Well Supply Co. (U. S. Steel Corp.)
Packard Motor Car Co.
Pittsburgh Steel Foundry Corp.
H. B. Salter Co.
Shenango Penn Mold Co.
Standard Foundry Co.
Union Brass & Metal Mfg. Co.
Union Steel Castings Co.
West Michigan Steel Castings Co.
A. C. Williams Co.
Whiten Machine Works
Whiting Corp.

THE CARL-MAYER CORP.

3030 Euclid Ave., Cleveland, Ohio

Backed by reputation and over 30 years' experience



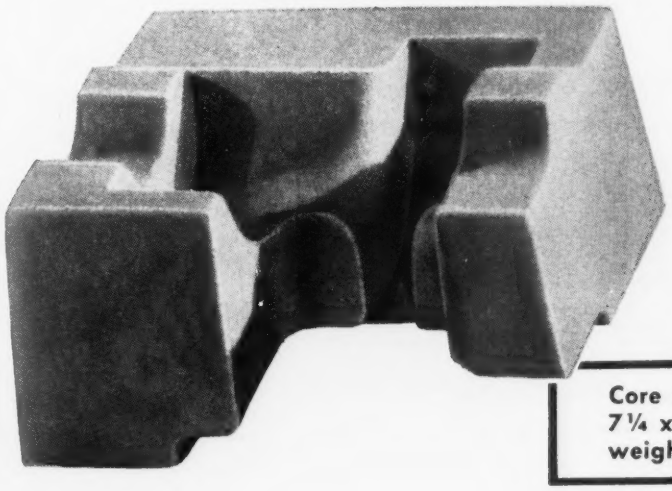
Picker *specializes* in x-ray, and x-ray only, covering the field like a blanket. *Whatever you need, we've got* . . . from a simple lead letter to a 22,000,000 volt betatron. To serve you, there are sales offices and service depots in all principal cities, staffed by skilled engineers prepared to cope with any x-ray problem promptly and with understanding. If you are now using x-ray, or are wondering whether you should, you can depend on Picker for objective technical counsel and efficient handling.

PICKER X-RAY CORPORATION 25 S. Broadway, White Plains, N.Y.
SALES OFFICES AND SERVICE DEPOTS IN PRINCIPAL CITIES OF U.S.A. AND CANADA

Foundromatic Dryer Dries Core in

3 Minutes...

Takes 70 Minutes in Conventional Oven



Core measures: 7¼ x 6¾ x 4, weighs 7 pounds.

WITH THE *Foundromatic* dryer you not only slash core *baking* time, but you reduce core *handling* time by eliminating:

1. **Collecting Rack**
2. **Cooling Rack**
3. **Storage Rack**

Cores can go directly from the *Foundromatic* dryer to the molder. They are cool, dry, ready-to-use the moment they come out of the dryer.

In addition, these cores have excellent shakeout characteristics and a smooth finish that means better castings. Fuel costs are lower, too, because no energy passes between the electrodes when there are no cores in the oven. No overbaking either! A core left in the oven all day will not burn.

Find out more about the time- and money-saving *Foundromatic* Core Dryer by calling your nearby Allis-Chalmers district office. Or write Allis-Chalmers, Milwaukee 1, Wisconsin. A-3891

Foundromatic is an Allis-Chalmers trademark.

ALLIS-CHALMERS

FOUNDROMATIC *Dielectric* SAND CORE DRYER

QUESTIONS and ANSWERS

About Dielectric Sand Core Drying

1. ***How much savings can I expect with the*** Foundromatic ***core dryer?***

   Estimated savings of 55% to 70% have been reported.

2. ***Do I need an electronic engineer to help me?***

   No. Once equipment is installed and operating, any personnel can be quickly trained to follow operating instructions.

3. ***How much maintenance is there?***

   Very little. Periodic oiling of conveyor and blower motors and rollers; and replacement of tubes.

4. ***How long must we wait after cores pass through dryer before they can be used?***

   Cores can be used immediately.

5. ***Does the*** Foundromatic ***core dryer use power when empty?***

   No. Dielectric heaters inherently deliver no power unless the material is between the electrodes.

6. ***Will light sections burn if dried with heavy sections?***

   No. Cores will not burn in the *Foundromatic* core dryer.

7. ***What about collapsibility?***

   Resin bonded cores have very good collapsibility, contributing to a faster, cleaner shakeout.

SEND

Allis-Chalmers A-3891
Milwaukee 1, Wisconsin

Please send me new 8-page booklet 15B7306B containing complete information on the *Foundromatic* sand core dryer.

Name .....
Title .....
Company .....
Street .....
City State

SUPERLATIVE FOR

STRAIGHT WHEELS
... for removing flash from non-ferrous castings.

MOUNTED WHEELS
... for removing tool marks and scratches from finished surfaces.

MX

the versatile, long life, self-cleaning, high strength, cushion-action abrasive

by CARBO

TRADE

"Carborundum" and "MX" are registered trademarks which indicate manufacture by The Carborundum Company, Niagara Falls, New York

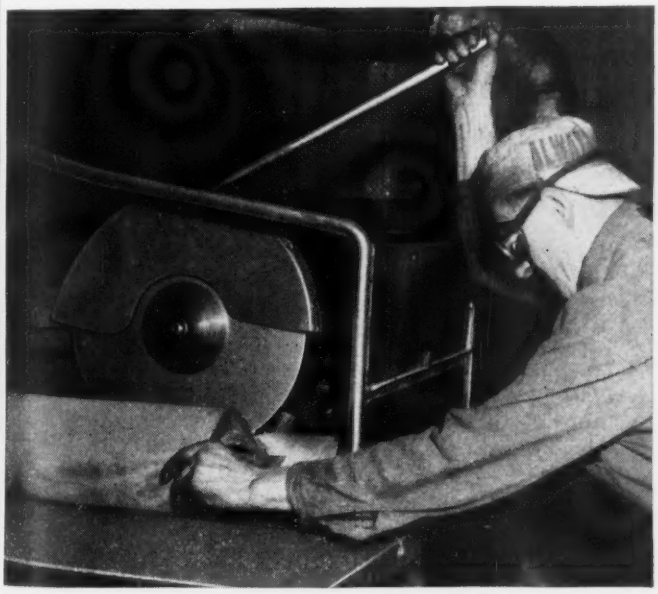
CLEANING UP CASTINGS

DEPRESSED CENTER WHEELS

...for removing mold marks from non-ferrous castings.

DISCS

...for removing flash from cast iron housings. Also for removing fins between molded sections of castings.



PRODUCTION CUT-OFF WHEELS

...for cutting gates and risers from all types of non-ferrous castings.

MX—one great product in 5 distinct forms—each one a superior cost-cutter for foundrymen everywhere!

The reason lies in the MX bond, tough yet resilient—it provides a fast-cutting action that's extremely soft and clean, yet rugged enough to perform many heavy-duty operations.

Get the MX story from your CARBORUNDUM or distributor salesman —or write Dept. F 81-60

RUNDUM

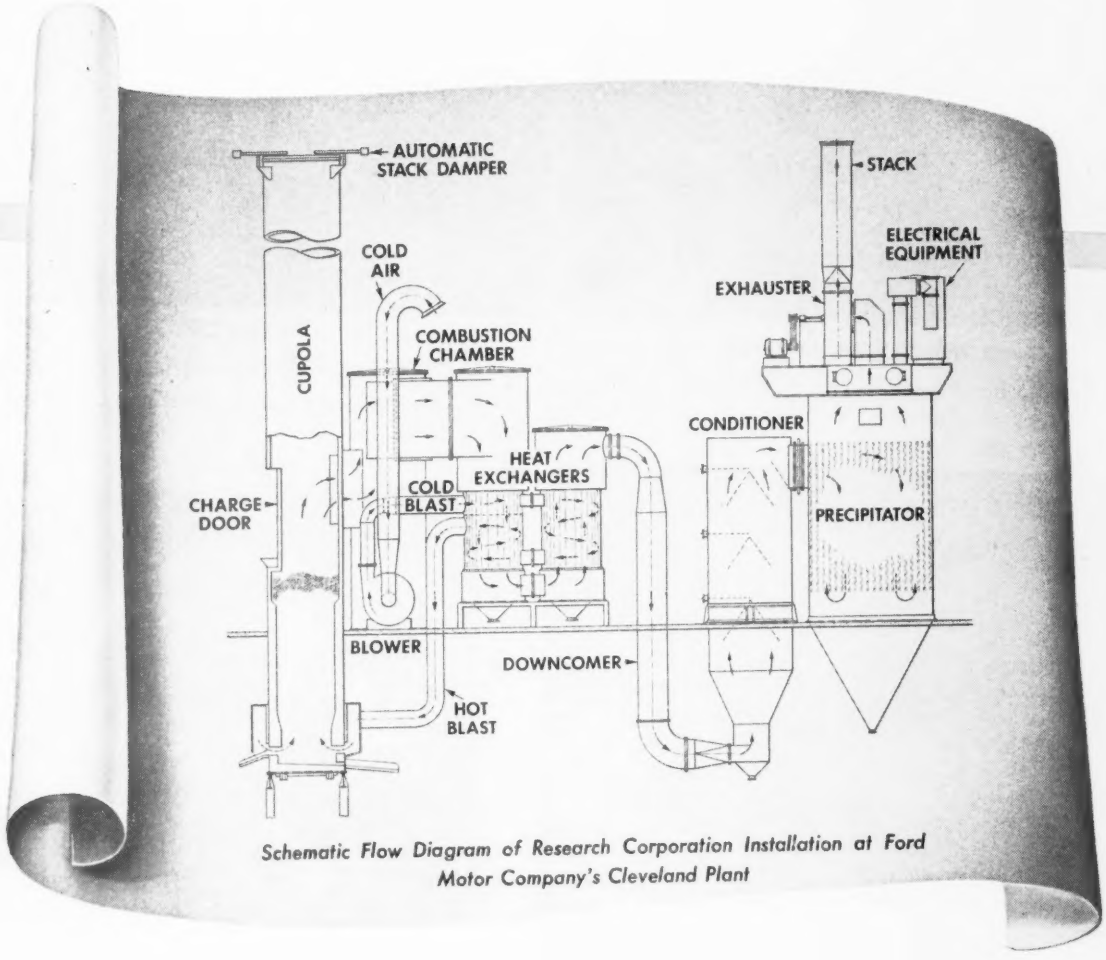
MARK

offering ALL abrasive products...to give you the proper ONE

81-60

NEW CUPOLA PRECIPITATORS

assure clean stacks at Ford



Schematic Flow Diagram of Research Corporation Installation at Ford Motor Company's Cleveland Plant

The schematic diagram above shows how one of the five Cottrell Precipitators removes suspended dust from the gases originating in ten iron ore cupolas. These Research Corporation units consist of (A) a water spray conditioning and cooling chamber, (B) a vertical flow precipitator with the patented MI Rapper, which eliminates rapping puffs, and (C) an induced draft fan.

If your cupola stack gases are a problem, contact your Research Corporation Engineer. He will give you the benefit of development and pilot plant experience as well as recommendations based on results of commercial installations.

RESEARCH CORPORATION

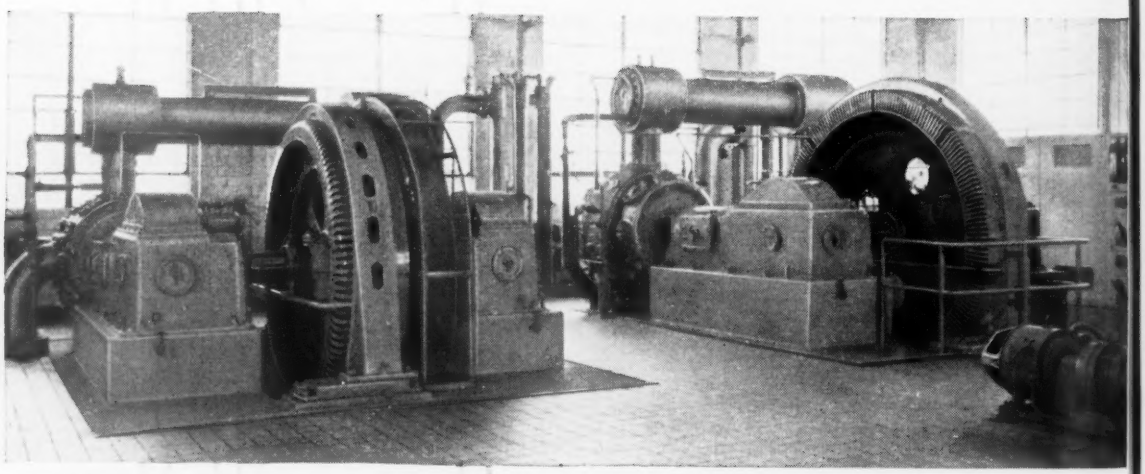
405 Lexington Avenue, New York 17, N. Y.
Bound Brook, N. J. • Grant Building, Pittsburgh 19, Pa.
122 South Michigan Avenue, Chicago 3, Illinois

RC 142

LINBOND
742
LINSEED
OIL
Linbond
CORE OIL
No. 742
500°F
450°F
400°F
350°F
300°F
1 In the same class for strength as Linseed
2 Reaches top strength faster than Linseed
3 Costs considerably less than Linseed
4 For color and clean working, matches Linseed
Tensile tests by Dietert show Linbond reaching top strength 25 minutes faster at 425°F and 40 minutes faster at 400°F than Linseed.
As a top strength oil Linbond No. 742 will save both time and money. Write for details.
UNITED OIL MFG. CO.
ERIE · PENNSYLVANIA
TIME IN OVEN (MINUTES)
TIME IN OVEN (MINUTES)

NO CLOCK PUNCHING

for these compressors



That's right! There's no daily time limit placed on the work output of Chicago Pneumatic Class O-CE Compressors . . . they operate "around the clock" with a minimum of attention. Designed for continuous, year-in, year-out heavy industrial usage, these units are unsurpassed for a dependable air power supply at low cost. Built in sizes up to 2,000 hp, for pressures up to 5,000 lbs., they are available in horizontal, two-stage, water-cooled types with direct-mounted synchronous motor drive.

The Chicago Pneumatic Class O-CE Compressor is equipped with roller bearings, Simplate valves for low power consumption, streamlined air passages to cut down air flow resistance, CP Multi-Step Control for partial load economy, and a CP Intercooler for maximum heat transfer and low water consumption. Ask for Bulletin 726. *Chicago Pneumatic Tool Company, 8 East 44th Street, N. Y. 17, N. Y.*

Chicago Pneumatic

PNEUMATIC TOOLS • AIR COMPRESSORS • ELECTRIC TOOLS • DIESEL ENGINES • ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

PENN SAND

SILICA FLOUR

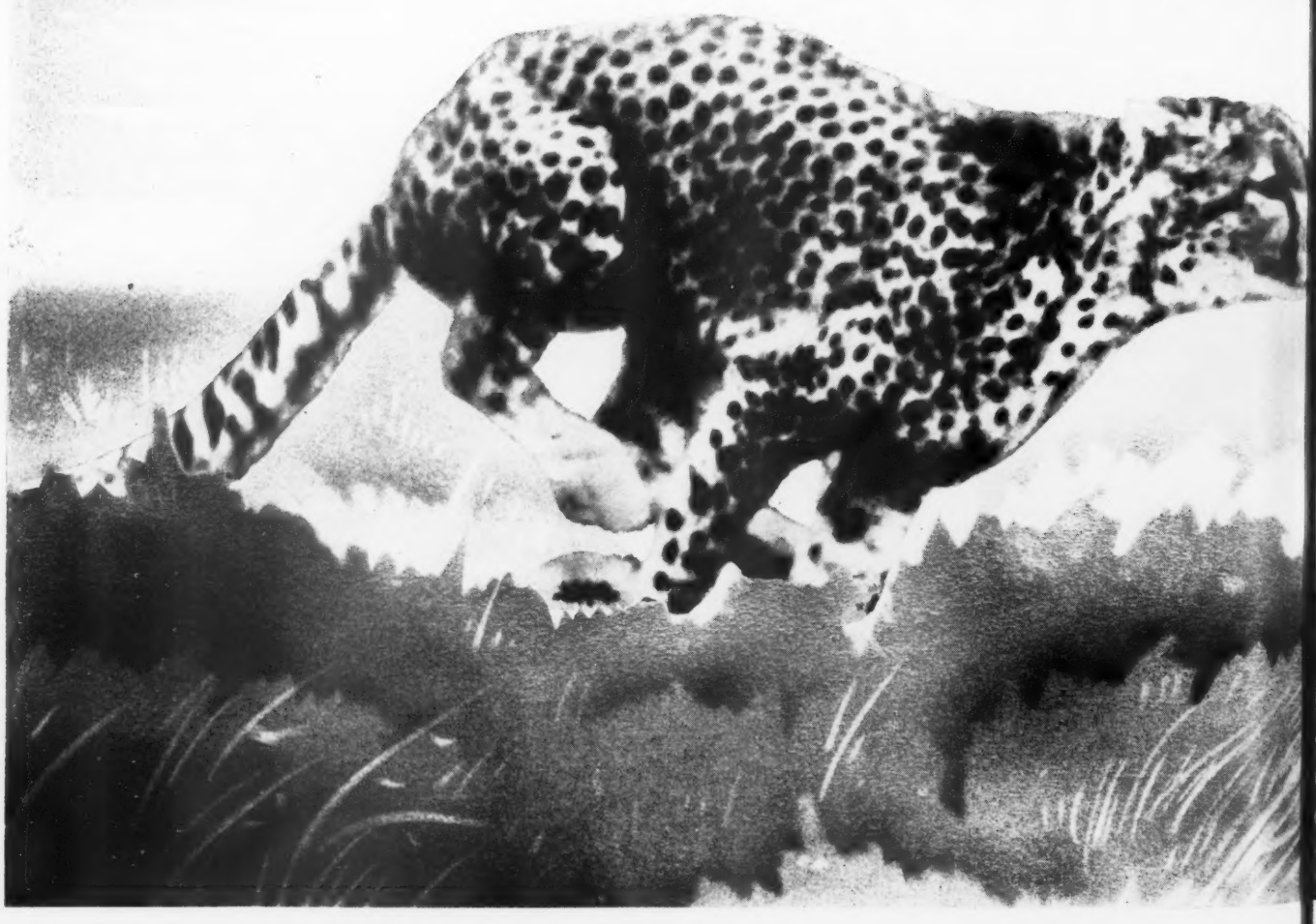
it makes sense . . . use the best AT NO EXTRA COST

The excellent refractoriness of PENN SAND Silica Flour reduces metal penetration, minimizes surface defects and produces castings of exceptionally smooth finish. In your mold wash, you will find that constantly uniform PENN SAND Silica Flour gives the same suspension and thickness of application every time; you always get the same even coating. ● Its high fusion point and perfect uniformity also make PENN SAND Silica Flour ideally suited as an admixture to your mold and core sands. Supplied by the country's leading producer of quality silica products, PENN SAND Silica Flour is available for immediate shipment to you in a complete range of grades. ● It makes sense to use the best silica flour when it costs no more. Write today for free samples—and on your next order be sure to specify PENN SAND Silica Flour, the most economical material for mold wash.

PENNSYLVANIA PULVERIZING COMPANY
subsidiary of PENNSYLVANIA GLASS SAND CORPORATION
producers of
MOLDING SAND • CORE SAND • SHELL-MOLDING SAND • SANDBLAST SAND
General Sales Offices: GATEWAY CENTER, PITTSBURGH, PA. • Eastern Sales Office: TRENTON TRUST BLDG., TRENTON, N. J.

Copyright 1953 Pennsylvania Pulverizing Company, Pittsburgh, Pa.

The cheetah has been employed for centuries, in India and Persia, for hunting antelope and other game. It is handled like a falcon—leashed, hooded and kept blindfolded until the game is in sight, when it is loosed. With a great bound, it darts after the quarry, which it quickly overtakes, drags down and holds until the huntsman comes.



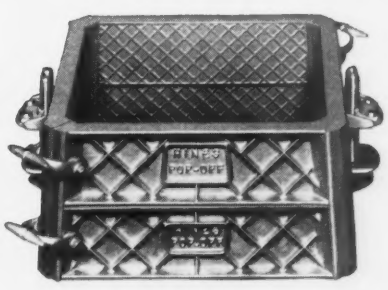
SPEED

The cheetah, or hunting leopard, is the fastest animal in the world. Its long, slender limbs give it an amazing *speed* over short distances—reportedly as high as seventy miles per hour.

There are many ways in which to compare foundry flasks for *speed*, but the one sure way is to compare them by the results obtained. That is, from a given number of molds produced, how many good castings are obtained? That's the true test of the speed you get from any flask, and in that respect, particularly, HINES FLASKS are really outstanding. Production reports from leading foundries everywhere show that HINES FLASKS produce an unusually high percentage of good molds and, conversely, less scrap.

So, if it's *speed* you're after in your foundry, check up on the flasks you're using. If they aren't HINES FLASKS, you're wasting time—and money.

HINES FLASKS



HINES POP-OFF FLASK

THE HINES FLASK CO.

3431 WEST 140TH STREET, CLEVELAND 11, OHIO · TELEPHONE: ORCHARD 1-2806

new BAKER gas-O-matic

. . . ELECTRIC TRUCK OPERATING ECONOMY
. . . . . GAS TRUCK INITIAL COST !

gas-O-matic is a revolutionary new gasoline-powered fork truck with electric motor drive—designed from engine to drive wheels to incorporate the best features of both gas and electric trucks.

The secret of its outstanding performance and amazing operating economy is the new Baker GAS-O-MATIC transmission system. A specially designed variable voltage generator provides an incredibly smooth *unbroken* acceleration curve—directly controlled by the gas throttle.

ELIMINATION OF CLUTCH cures the biggest maintenance headache of gas-powered trucks.

ELIMINATION OF CLUTCH AND GEAR SHIFT prevents jerky starts and "step-ladder" acceleration.

ELIMINATION OF CONTROLLER AND RESISTANCE BANKS of electric and gas-electric trucks means fewer moving parts and results in less down time and lower maintenance costs.

gas-O-matic has the smoothest acceleration and best "inching" characteristics of any fork truck, regardless of type of fuel or transmission. It is ideal for ramp work, for tiering, and for long or short haul operations. In fact it will perform almost any fork truck job better and cheaper.

gas-O-matic will do everything a comparable straight gas truck can do—do most of it better and more economically . . . plus some things that straight gas cannot do.

It will do almost everything a battery-powered fork truck can do—and some of it better . . . plus a few things that battery-power cannot do!

—Yet it costs little more* than a straight gas truck of the same capacity, and only about half as much as a battery-powered electric with charger and two batteries!

* **gas-O-matic** *model illustrated, 4,000 lb. capacity costs only* **$4895.00**

THE BAKER-RAULANG CO. 1853 100th anniversary 1953 THE BAKER-RAULANG CO.

write for descriptive Bulletin No. 1344

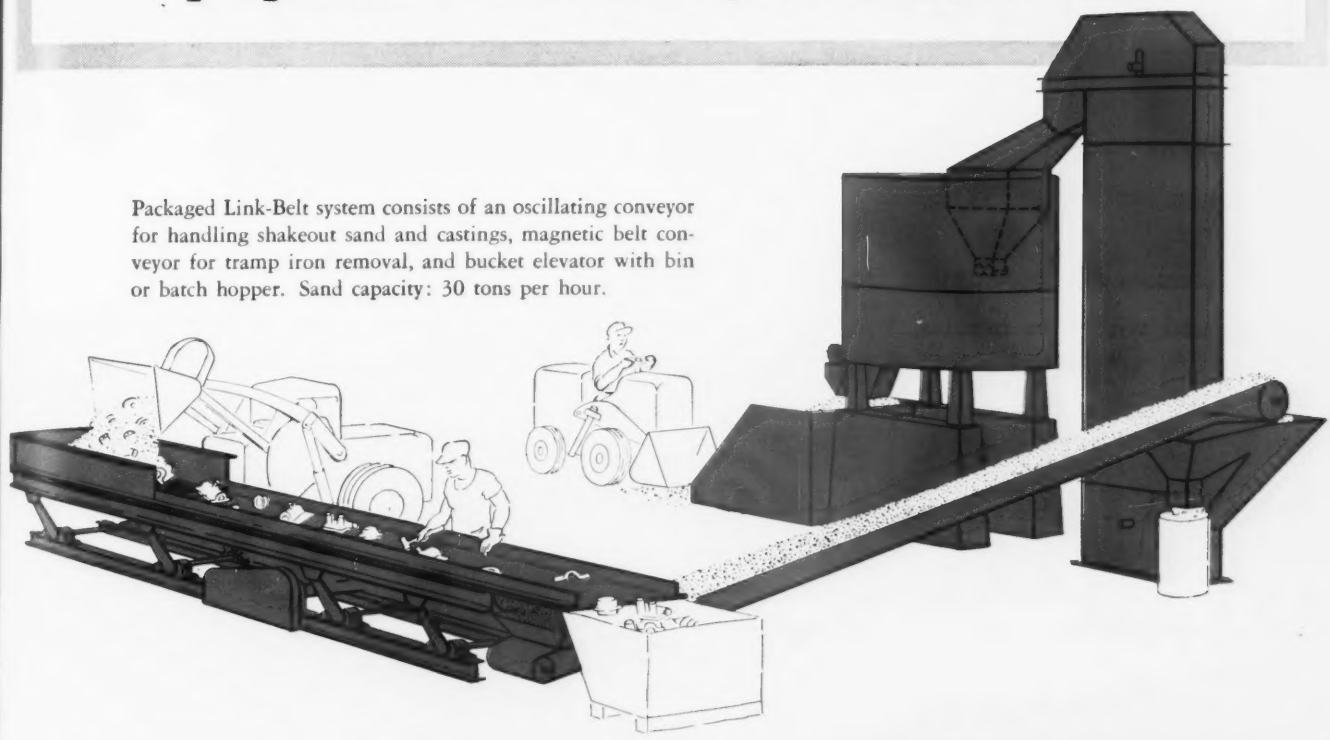
THE BAKER-RAULANG COMPANY
1223 WEST 80th STREET • CLEVELAND 2, OHIO

The Baker-Lull Corporation, Subsidiary, Minneapolis, Minnesota
Material Handling and Construction Equipment

Baker ®
industrial trucks

Now small foundries cut costs

with pre-engineered, packaged sand preparation and casting handling system



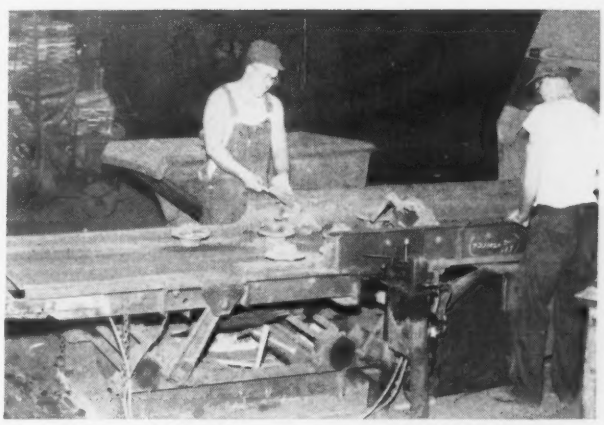
Packaged Link-Belt system consists of an oscillating conveyor for handling shakeout sand and castings, magnetic belt conveyor for tramp iron removal, and bucket elevator with bin or batch hopper. Sand capacity: 30 tons per hour.

LINK-BELT combines ruggedness, compactness and low cost in a modern, mechanized unit

IF you have less than 100 employees in your foundry, here's the ideal answer for increased output of better castings . . . at lower cost. Link-Belt has applied its broad experience in foundry handling problems to produce a compact, pre-engineered system that revolutionizes small foundry casting operations. It means "big foundry" organization and efficiency, regardless of the volume of your production.

Through modern sand control, this unit will quickly pay its way by reducing labor costs and improving casting quality. Equally important, systematic handling of sand and castings assures better working conditions and a cleaner foundry . . . eliminates wasted floor space.

Whether your foundry is large or small—gray iron, steel, malleable or non-ferrous—Link-Belt engineering and equipment fill the bill. A foundry specialist will be glad to work with you or your consultant. Your nearest Link-Belt office welcomes the opportunity to give you complete information.



Link-Belt Oscillating Conveyor has perforated trough at feed end to act as shakeout section and plain section of trough for spruing and sorting of castings. Air cylinder operates damming gate between sections to hold back castings for proper shakeout action.

13,278

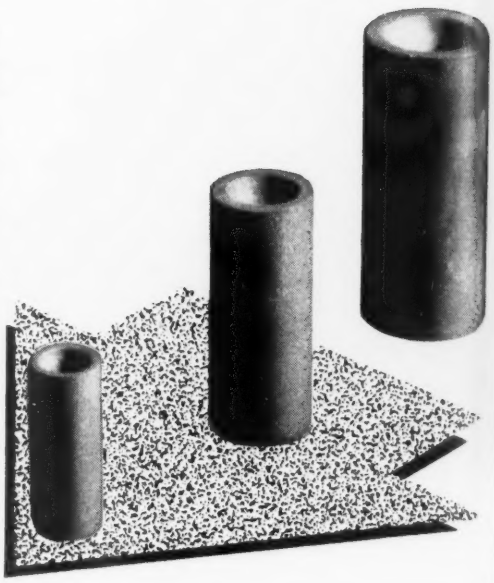
LINK-BELT

CONVEYORS AND PREPARATION MACHINERY

LINK-BELT COMPANY: Plants: Chicago, Indianapolis, Philadelphia, Colmar, Pa., Atlanta, Houston, Minneapolis, San Francisco, Los Angeles, Seattle; Scarboro, Toronto and Elmira, Ont. (Canada); Springs (South Africa); Sydney (Australia). Sales Offices in Principal Cities.

THREE REAL REASONS WHY

you should use the NORBIDE Pressure Blast Nozzle:

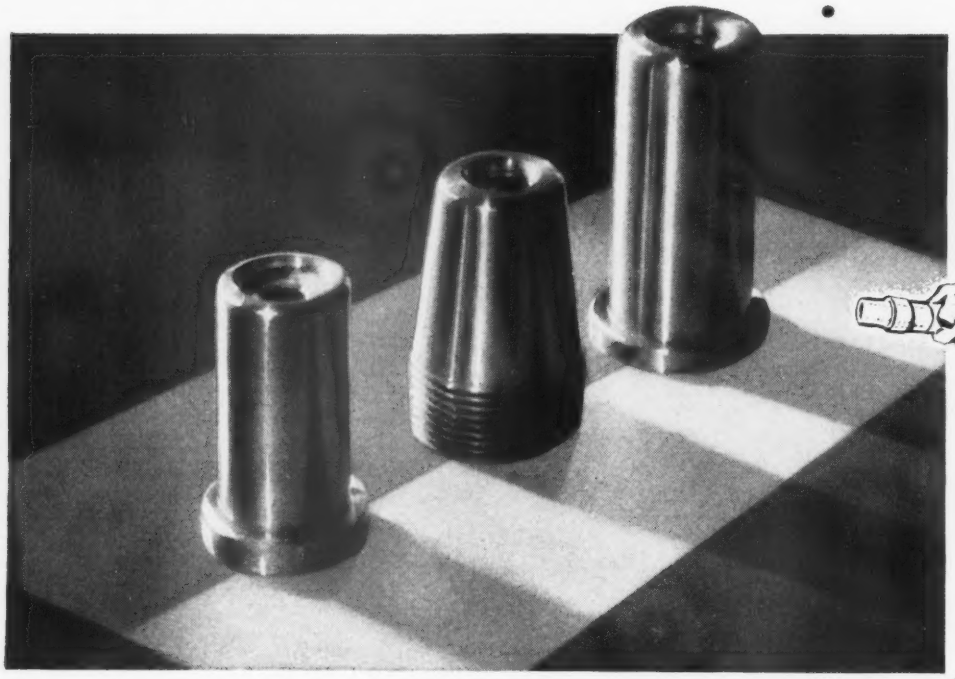


1. More service per dollar cost (750 hours silica sand — 1500 hours steel grit or shot). Norton guarantees this minimum service.

2. Decreases air consumption from 10 to 20 percent as compared with iron nozzles.

3. Maintains stream contour and abrasive velocity.

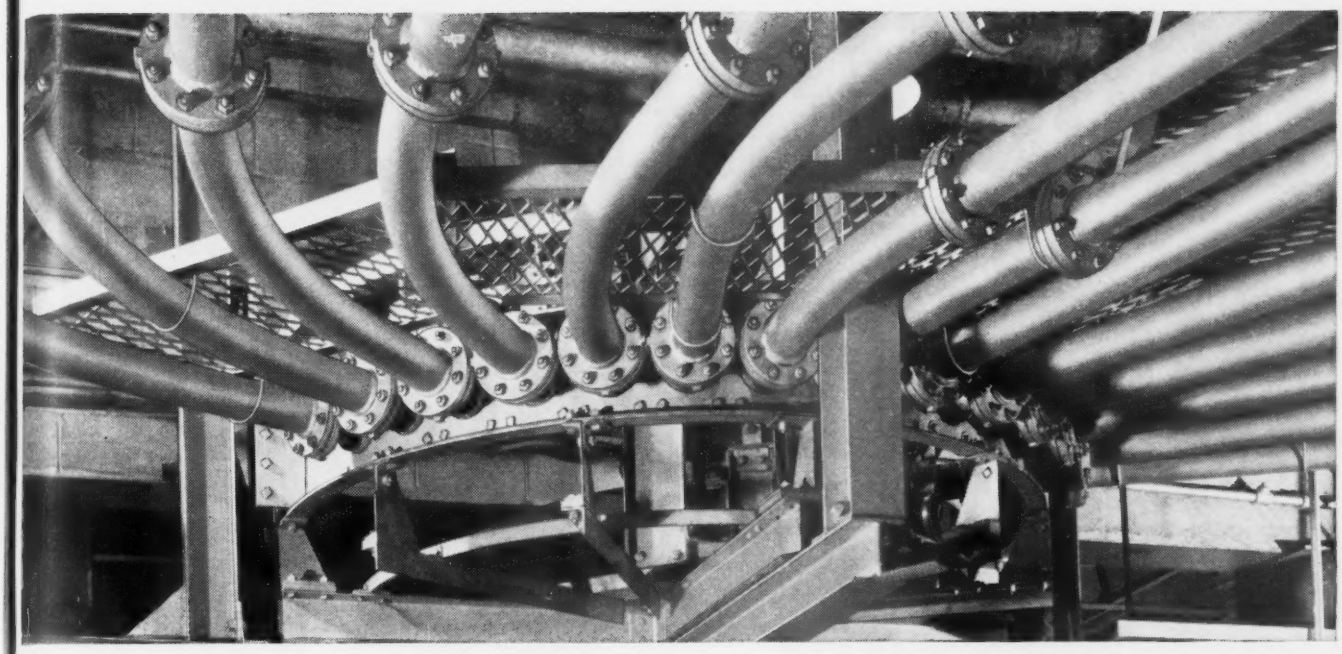
NORTON COMPANY
WORCESTER 6, MASSACHUSETTS



Only the diamond is harder than Norbide

NORTON

Making better products to make other products better



NEW WEAPON AGAINST RISING FOUNDRY COSTS!

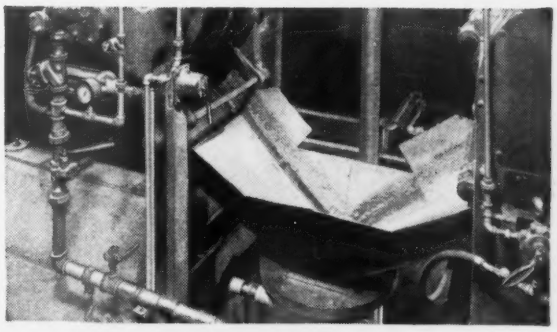
CRANE *TURBO-DRIVE* moves core sand in a breeze at famous EATON foundry

The awesome unit above is really very simple—but of extreme importance to the over-all efficiency of the Eaton Manufacturing Company foundry at Vassar, Michigan.

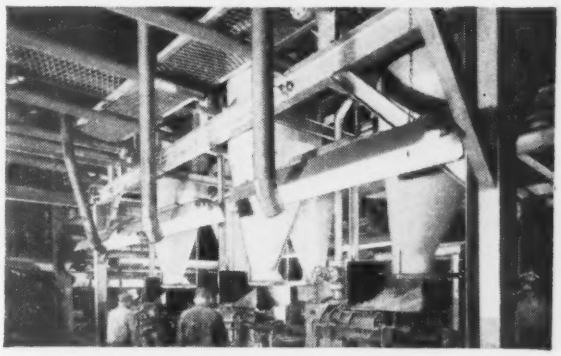
It's the multiple switch of the revolutionary Crane Turbo-Drive system that enables the muller operator to deliver a 400-pound batch of mulled core sand to any of fourteen core-blowers in seconds—and in complete safety. Economical compressed air provides the movement, and "go-anywhere" 4-inch steel piping is the conveyance. It's a cleaner, space-saving, sand-transporting system adaptable to any foundry.

But more important, Crane Turbo-Drive effects real savings in time, maintenance and man power—and actually increases production at the core-blowers. Eaton reports up to 15% greater output. *And all this at a lower initial cost than any equivalent sand-transporting system.*

Make it a point to mail the coupon today!



Driver unit of Crane *Turbo-Drive* system is directly below mullers. Unit shown is 7 cu. ft. capacity. 15 and 30 cu. ft. models available.



Production is up at the 14 core-blowers served by Crane *Turbo-Drive* through a single multiple switch. Single transfer switches may also be used.

CRANE CO.

General Offices: 836 S. Michigan Ave., Chicago 5, Illinois
Branches and Wholesalers Serving All Industrial Areas.

VALVES • FITTINGS • PIPE • PLUMBING • HEATING

CRANE CO., Turbo-Drive Division
836 S. Michigan Ave., Chicago 5, Illinois

Gentlemen: Yes, I would like Turbo-Drive literature ( ); please have a representative call ( ).

Name_____ Title_____

Company_____

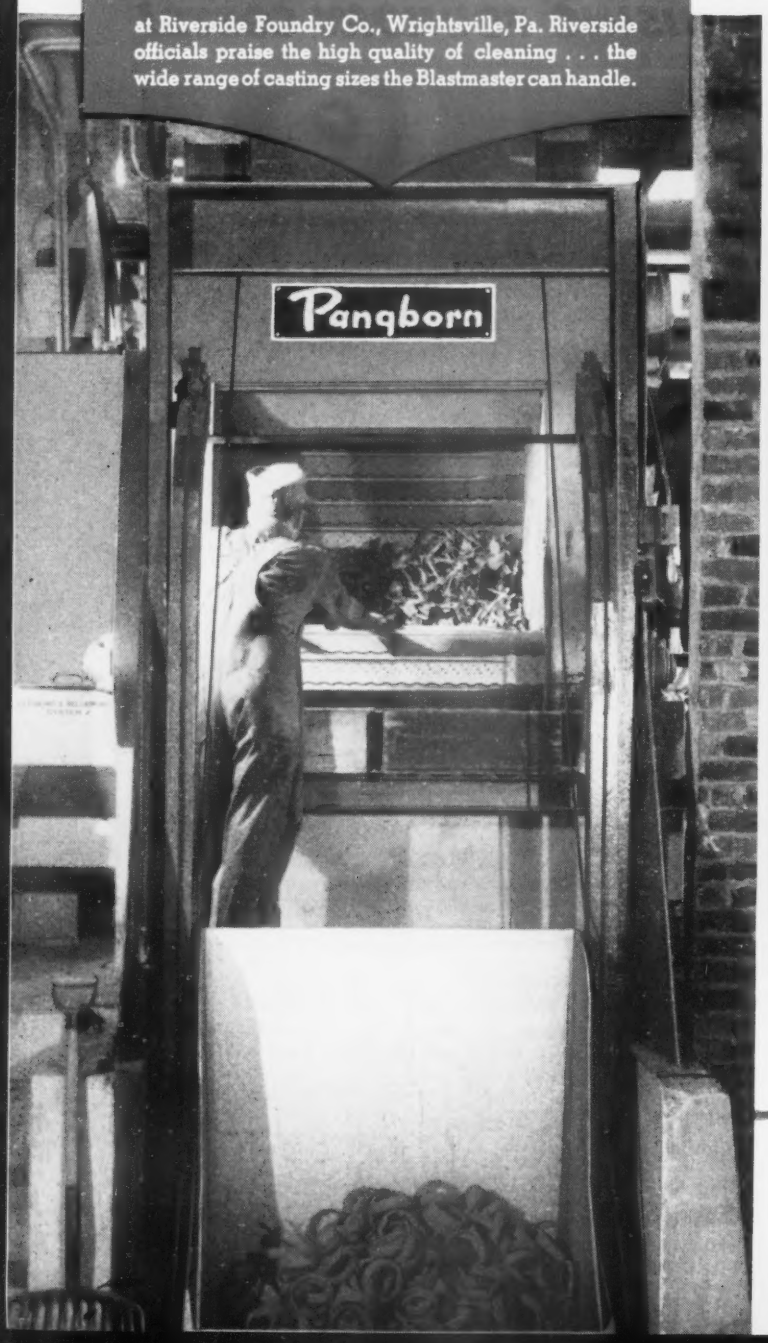
Address_____

City_____ Zone____ State_____

Higher output, lowe
Pangborn Blastmas

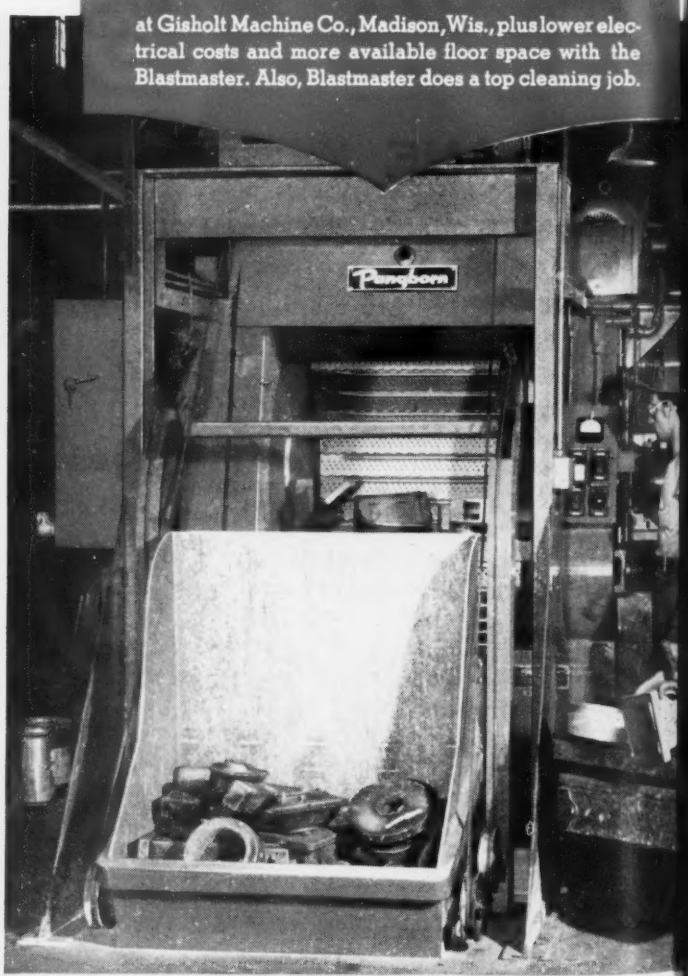
Doubled cleaning output per man-hour

at Riverside Foundry Co., Wrightsville, Pa. Riverside officials praise the high quality of cleaning . . . the wide range of casting sizes the Blastmaster can handle.



33⅓% cut in labor costs

at Gisholt Machine Co., Madison, Wis., plus lower electrical costs and more available floor space with the Blastmaster. Also, Blastmaster does a top cleaning job.

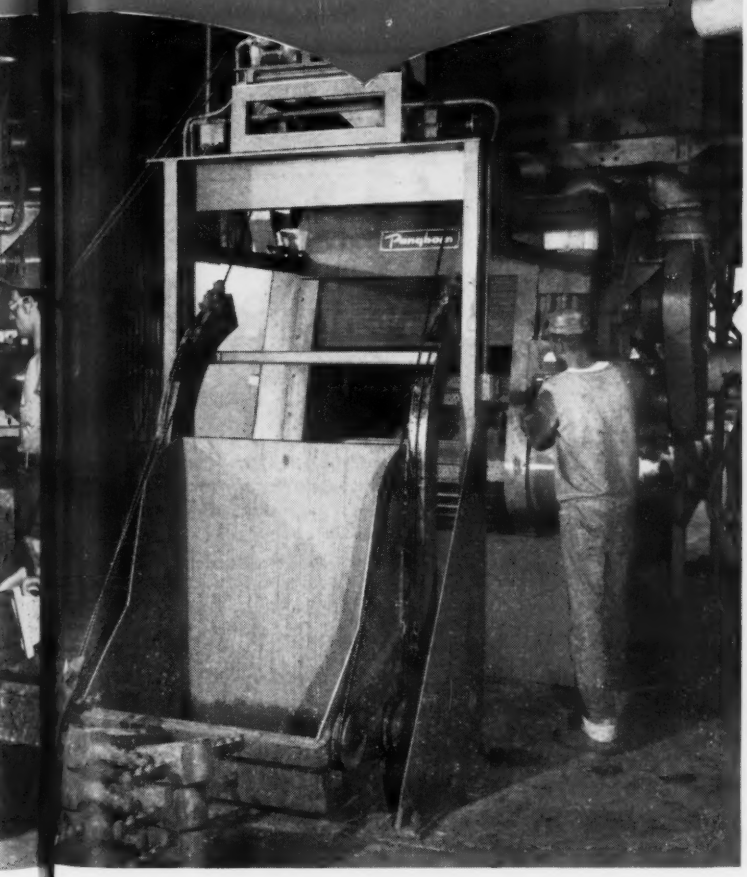


88 BLASTMASTER BARREL SOLD IN 9 MONTHS

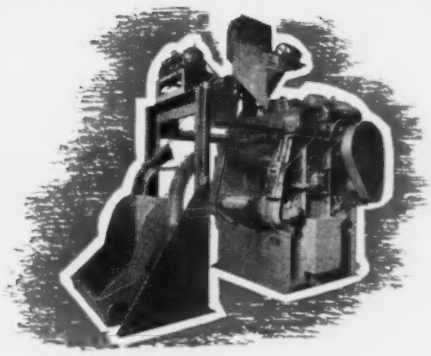
;osts, job versatility...
sr gives you all three!

Great variety of cleaning jobs

at Emsco Derrick & Equipment Co., Los Angeles, Cal. Blastmaster cleans intricate castings, forgings and stampings *faster* and *better*.



These firms proved these claims for the Pangborn Blastmaster Barrel



USERS of the Pangborn Blastmaster ROTOBLAST® Barrel know that Blastmaster's exclusive features pay off in better, faster, cheaper cleaning! They praise features like the abrasive-tight door that prevents waste . . . the automatic throw-out torque arm that protects machine and operator . . . the work conveyor that will not clog or pinch . . . the easy-to-adjust conveyor take-up. And Blastmaster incorporates the famous Pangborn ROTOBLAST that does a *better* job and saves you money by saving you time, labor, space, power and tools!

Whatever aspect of blast cleaning interests you—quality, speed, economy, or all three—find out more about the Pangborn Blastmaster Barrel. Available in 4 sizes—3, 6, 12, or 18 cu. ft. capacities. For more details, write for Bulletin No. 223 to: PANGBORN CORP., 1400 Pangborn Blvd., Hagerstown, Md.

OVER 28,000 PANGBORN MACHINES SERVING INDUSTRY

Look to Pangborn for the latest developments in Blast Cleaning and Dust Control equipment

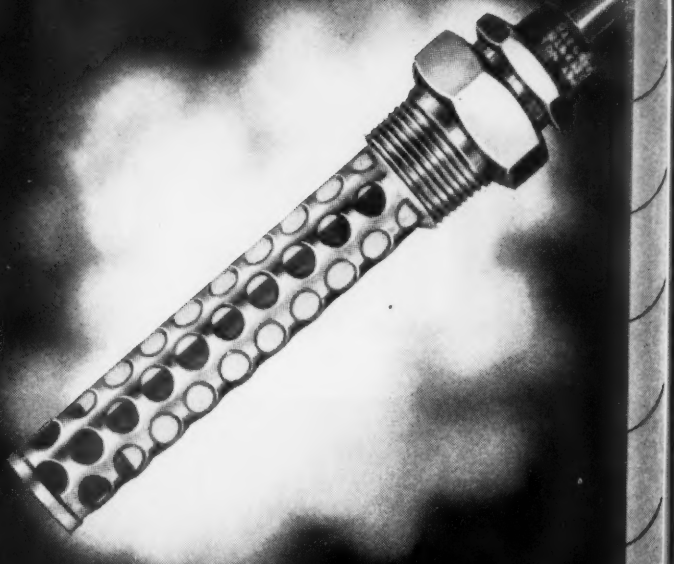
MEMBER FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION FEMA

Pangborn

BLAST CLEANS CHEAPER

with the right equipment for every job

Amazingly simple way to measure BLAST AIR DEW POINT



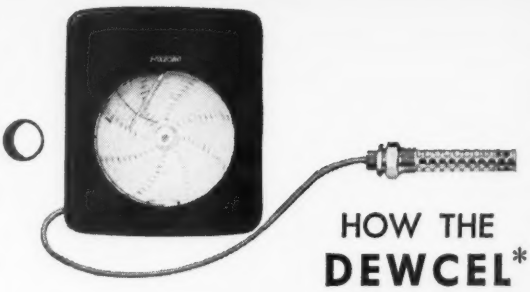
directly . . . accurately . . . continuously

Now you can measure or control the moisture content of blast air with simplicity and accuracy never before obtainable!

The exclusive Foxboro Dewcel*, an entirely new type of humidity-sensitive element, has made this possible, and at surprisingly low cost. Coupled with a Foxboro Recorder or Controller, the Dewcel offers these outstanding advantages:

1. Direct recording in dew point temperature, at existing pressure.
2. Wide working range — even operates at sub-zero temperatures.
3. Neither adds nor removes water from atmosphere.
4. No water box or circulation of air required.
5. Simplicity that eliminates maintenance.
6. High sustained accuracy.
7. Initial and operating economy.

Record blast dew point and know your moisture conditions! Investigate the Foxboro Dewcel element . . . write for Bulletin 407. A nearby Foxboro Engineer will also be glad to discuss blast moisture *control*. **The Foxboro Company, 327 Neponset Avenue, Foxboro, Mass., U.S.A.**



HOW THE DEWCEL* WORKS

The Dewcel element is a thermometer bulb (liquid-filled or electric-resistance type) jacketed with lithium-chloride-impregnated woven glass tape. Over this are wound two spaced gold or silver wires connected to an AC source. The lithium chloride absorbs moisture, allowing current to flow, generating heat, and raising the temperature. Equilibrium temperature is reached when vapor-pressure of the moist salt exactly balances that of the surrounding air or gas. The System translates this temperature into direct readings of dew point.

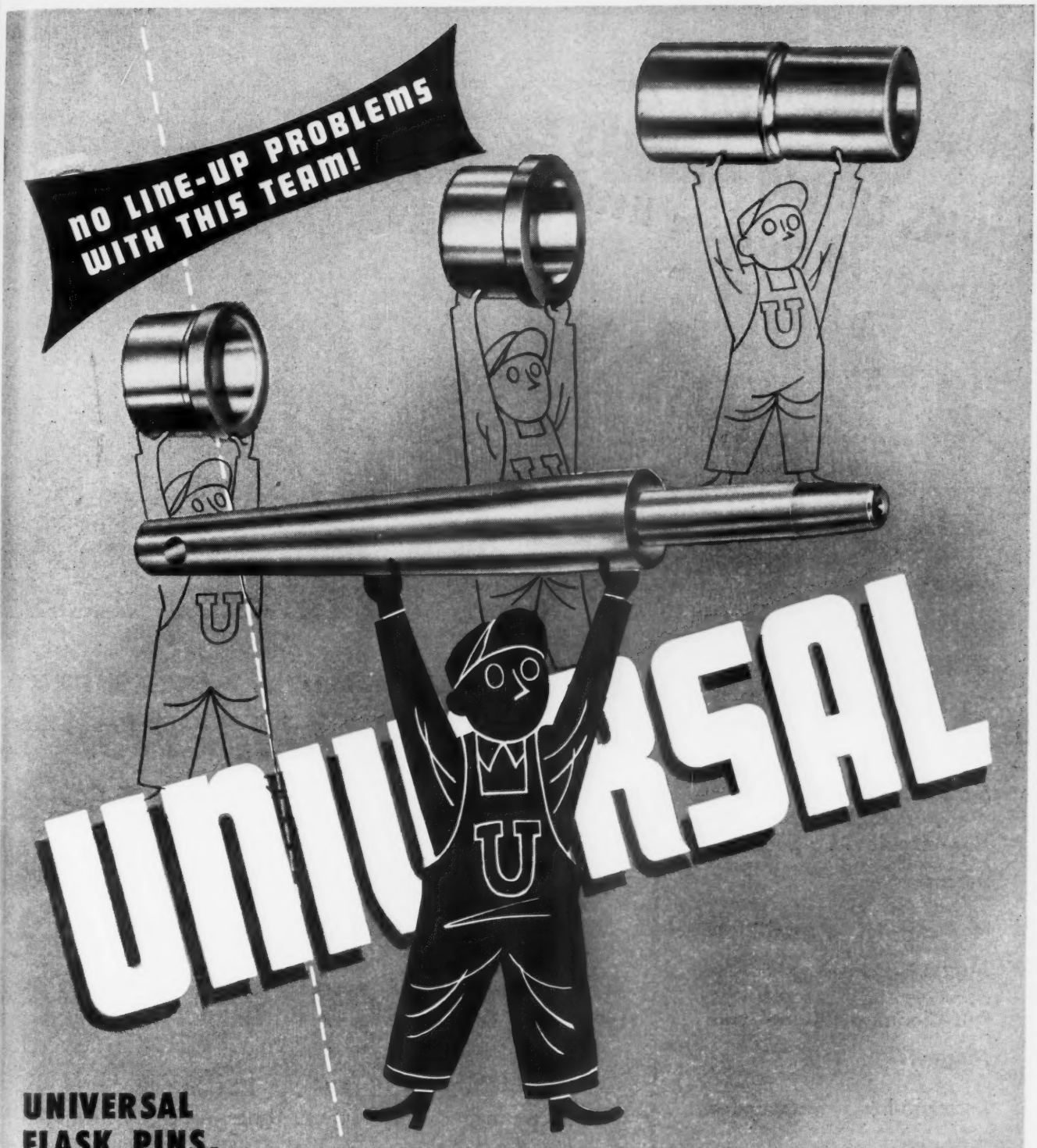
Thus, Foxboro Dew Point Instruments give direct readings or control of dew point from —50°F. to 142°F. at working temperatures from —40°F. to 220°F. Readings easily converted to absolute or relative humidity.

*Trade Mark

FOXBORO
REG. U. S. PAT. OFF.

RECORDING · CONTROLLING · INDICATING
INSTRUMENTS

FACTORIES IN THE UNITED STATES, CANADA, AND ENGLAND



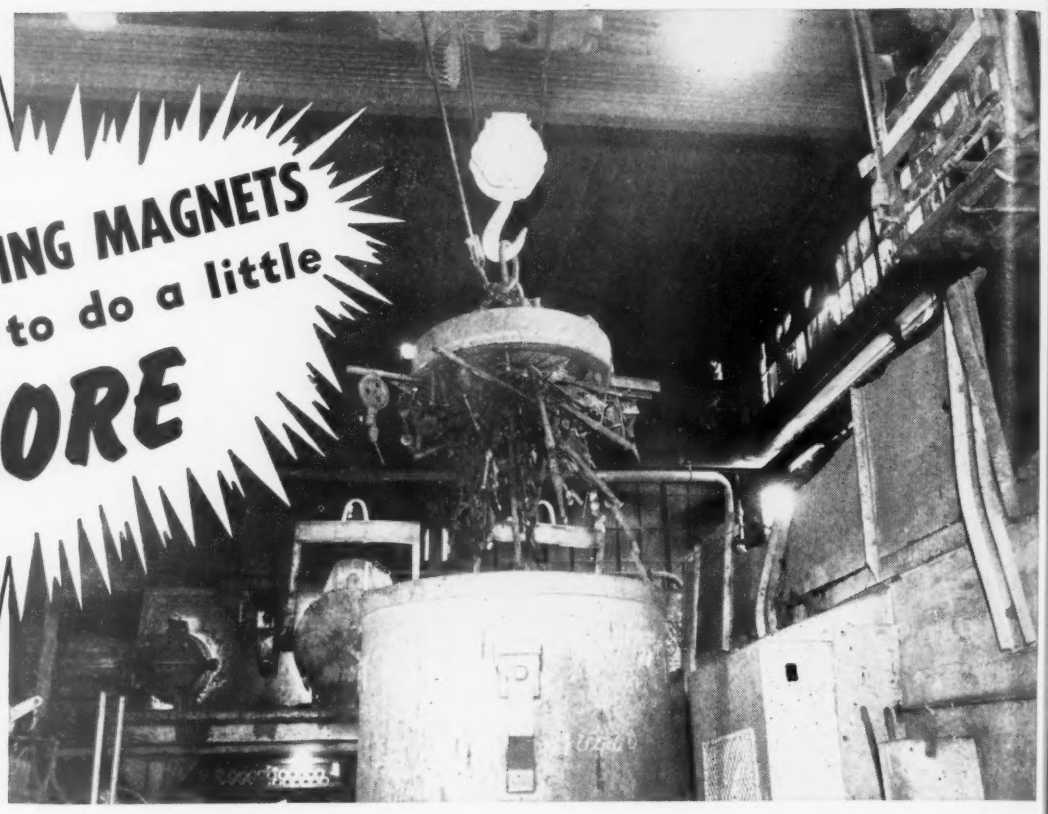
UNIVERSAL FLASK PINS, BUSHINGS, and CLOSING PINS for perfect alignment of cope and drag

Here is a team that has helped eliminate cope and drag problems in many foundries — Universal Flask Pins, Bushings and Closing Pins. Cope Bushings are quickly guided to the Drag Pins over tapered, loose-fitting Closing Pins which are quickly removed after assembly. Special design of Elongated Flask Bushing permits longitudinal expansion to compensate for metal heat, without affecting accurate alignment. Round, elongated, press fit and taper types for cast iron, steel, aluminum and magnesium flasks are available for immediate delivery in several sizes. Special types and sizes to order. Write for complete information.

UNIVERSAL ENGINEERING COMPANY

FRANKENMUTH 4, MICHIGAN

DINGS LIFTING MAGNETS Designed to do a little MORE



OTHER DINGS PRODUCTS FOR THE FOUNDRY—

Electric and Non-electric Magnetic Pulleys

Non-electric Magnetic Drums

Non-electric Perma-Plate Magnets

Self-Cleaning Perma-Plate Magnets

Rectangular Suspended Magnets

Self-Cleaning Rectangular Suspended Magnets

Portable and Stationary Pulley-type Separators

DINGS ALL-WELDED, WEATHERPROOF LIFTING MAGNETS:

- LIFT A LITTLE MORE
- WEIGH A LITTLE LESS
- LAST A LITTLE LONGER

— BUT COST NO MORE

BACKED by over 50 years of experience in the field of electro-magnet construction. Dings has supplied more foundries with magnetic separators than any other firm. When you need a lifting magnet check the DINGS.

Write for catalog B-1401-A giving construction details, capacities, ratings and dimensions.

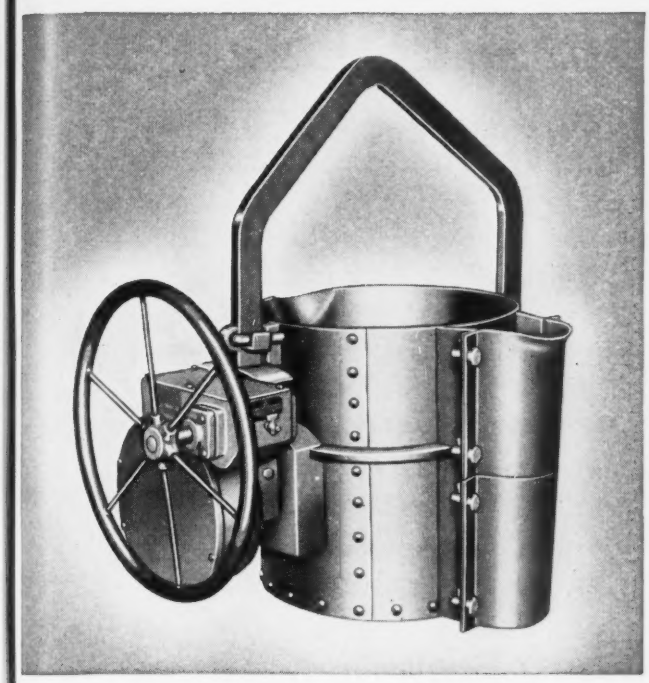
DINGS MAGNETIC SEPARATOR COMPANY
4708 W. Electric Ave., Milwaukee 46, Wis.

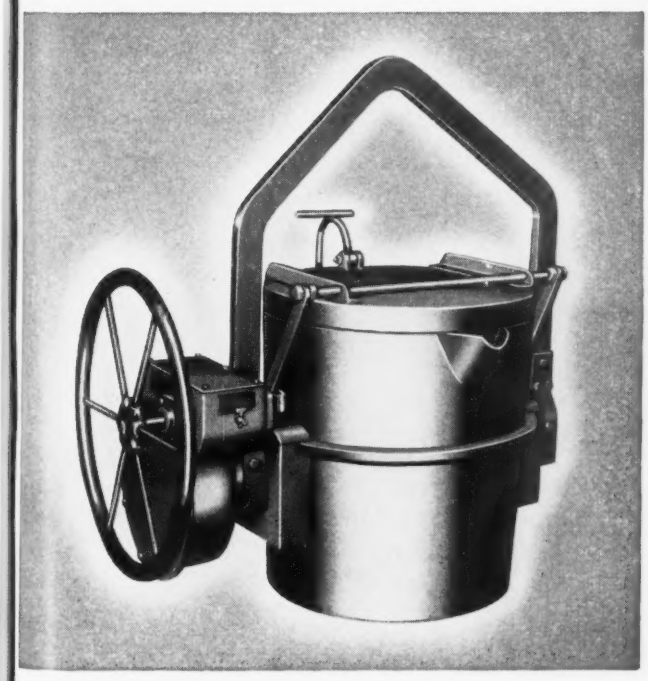
Dings Magnets

LM-3

YOU'LL FIND THE TYPE LADLE YOU WANT AT

Ladle Headquarters





Industrial Equipment has all the ladles: teapot spout . . . covered . . . cylindrical . . . reservoir . . . buggy . . . bottom discharge . . . and many others, standard and special.

Each represents the last word in proven design and operating efficiency. All Industrial Crane Ladles are available with Industrial's revolutionary new universal bail which completely eliminates binding from heat or misalignment.

All geared ladles use Industrial's new hi-safety, self-locking worm gearing which uses no gaskets and which can be easily adjusted by anyone.

Write for Industrial's latest catalog. Illustrations, sizes, dimensions, technical features: all are included.

LADLES

SHANKS

BOWLS

TONGS

Industrial
EQUIPMENT COMPANY
115 NORTH OHIO ST., MINSTER, OHIO

can be just as important to you!

Your life line . . . the single thing that keeps your plant operating at a profit . . . is efficient and continuous production. Your profits, employee morale, plant-community relations . . . all can be seriously threatened by inadequate dust or fume control.

Air is the all-important tool in dust and fume control. KIRK & BLUM skill and experience in putting to work "clean air—the *invisible* tool" is demonstrated in thousands of installations.

KIRK & BLUM, for over 45 years, have been specialists in designing, fabricating and installing dust and fume control systems. From the time engineers arrive to consult, to the moment skilled erectors leave . . . your work is in the hands of one experienced, reliable organization.

KIRK & BLUM engineers will confer with you on any dust or fume problem you may have. Write The Kirk & Blum Mfg. Co., 3108 Forrer Street, Cincinnati 9, Ohio.

FOR CLEAN AIR . . . THE INVISIBLE TOOL

KIRK AND BLUM

DUST AND FUME CONTROL

"THIS SAND MOLD MADE WITH G-E SHELL RESIN HELPED US CUT OVER-ALL COSTS BY 10%"

Mr A. A. Baker

That's what A. A. Baker, Plant Manager of J. A. Zurn Mfg. Co., reports about the *shell-cast* drain heads produced for his firm by TruCast Company, Newark, N. J. Shell molds made with General Electric shell resin were used to cast the nickel-bronze heads. This process reduced the over-all production cost of the piece by 10% because of reduced machining. As Mr. Baker says:

"Because of the excellent dimensional stability of the castings, four lathe operations, including a thread-cutting operation, were eliminated. This permitted a further elimination of some of the lathe-locating bosses. In addition, the smooth surface of the shell castings, free of hard skin, made machining and polishing much easier."

Ask G.E. about shell casting!

Shell casting is rapidly increasing in popularity because it helps you and your customers save money! Smooth surface finish, excellent dimensional stability and greater yield per man-hour are among its advantages over conventional sand-casting methods.

General Electric offers you a "team" of products to help you get maximum benefits from shell casting. *S-1054 phenolic shell resin* helps you make strong, dimensionally accurate sand shells with smooth surfaces and sharp contours. *SM-55 silicone parting agent* helps you obtain quick, easy release of shells from patterns. *Send the coupon today for free samples and technical data!*

Send coupon today for more details!

General Electric Company
Section 1317-3A, Chemical Division
Pittsfield, Massachusetts

Please send me:

Data	Sample	
☐	☐	S-1054 Phenolic Shell Resin
☐	☐	SM-55 Silicone Parting Agent

I want this for: ( ) Reference purposes only ( ) An immediate application on_____

Name_____

Firm_____

Street_____

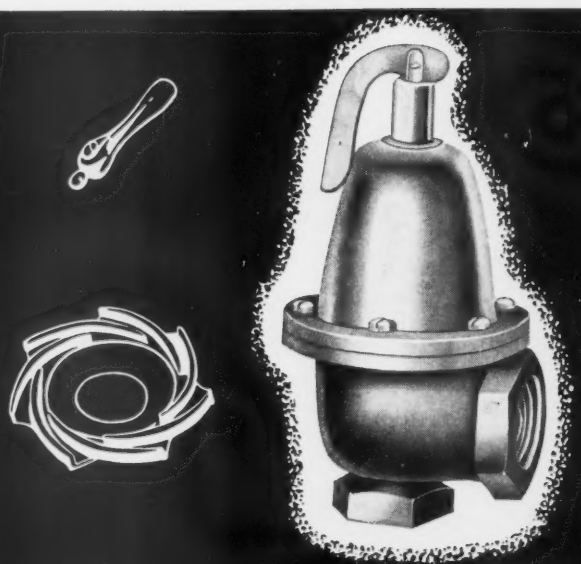
City_____ Zone____ State_____

You can put your confidence in

GENERAL ELECTRIC

Why Brass can better serve your needs

Economical MACHINEABILITY



BRASS CASTINGS FILL THE SPECIAL REQUIREMENTS OF MANY MANUFACTURERS

The free cutting characteristics of Brass are ideal in the manufacturing of all types of valves, impellors, plumbing fittings and other castings that require machining. This adjunctive feature provides for lower tool maintenance costs . . . more rapid machining, which in effect leads to increased production.

FREE . . . Write for your copy of the 8-page Lavingot Technical Journal — Vol. 9, No. 1 — containing an article discussing "Silicon Bronze."

Specify—LAVIN NONFERROUS INGOT—*Quality*

Brass · Aluminum · Bronze · Zinc Base Die Casting Alloys

R. LAVIN & SONS, INC.

- *Refiners of Brass, Bronze and Aluminum*
- *Producers of Zinc Base Die Casting Alloys*

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REPRESENTATIVES IN PRINCIPAL CITIES

R. LAVIN & SONS, INC. 1900 53 Years 1953 SERVING THE FOUNDRY INDUSTRY

SIMPLICITY SHAKEOUT AND CONVEYOR KEEP COSTS DOWN IN MODERN OHIO FOUNDRY

The modern foundry of the Ohio Stove Company, Portsmouth, Ohio, is engaged in the production of commercial gray iron castings, and the SIMPLICITY 4′ x 6′ shakeout and 3′ x 7′ model VS-12 conveyor shown on the job here are the key units in helping keep down the Ohio Company's unit production costs. To speed operations, snap molds are floor dumped and both castings and sand are scooped and loaded on to the SIMPLICITY shakeout. The castings are then carried to the waiting tote boxes on the SIMPLICITY CONVEYOR. • For complete facts about SIMPLICITY shakeouts, feeders and conveyors, write us today.

134

SALES REPRESENTATIVES IN ALL PARTS OF THE U.S.A.

FOR CANADA: Canadian Bridge Engineering Co., Ltd., Walkerville, Ontario

FOR EXPORT: Brown & Sites, 50 Church Street, New York 7, N. Y.

Simplicity

TRADE MARK REGISTERED

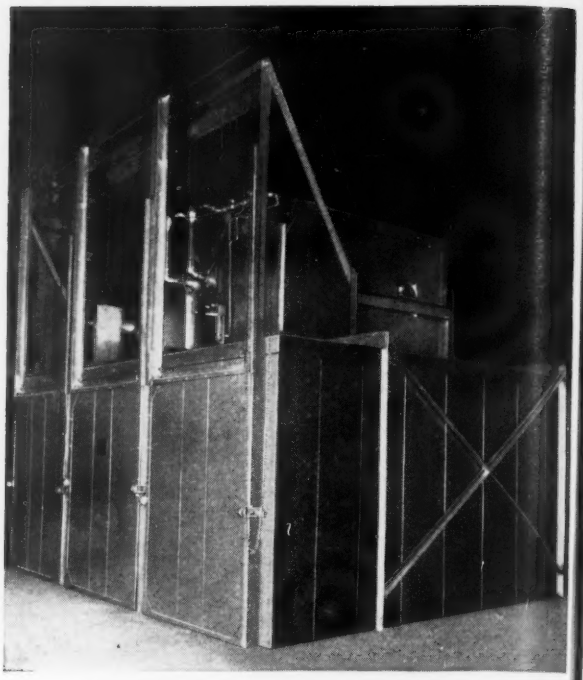
ENGINEERING COMPANY • DURAND, MICHIGAN

A LOT MORE THAN FANS DUCTS, HEATERS AND PANELS GO INTO . . .

LANLY FOUNDRY OVENS

The proper adaptation and utilization of the essential component parts in every LANLY OVEN for maximum operating efficiency and economy, is a certainty being proved every day in foundries throughout the country. Specialized knowledge evolved from long experience and close cooperation with our customers enables us to design and erect better foundry ovens.

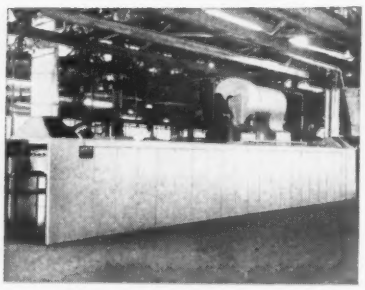
Upon receipt of information covering your needs, we will submit a proposal for an oven that will be thoroughly guaranteed as to construction and performance.



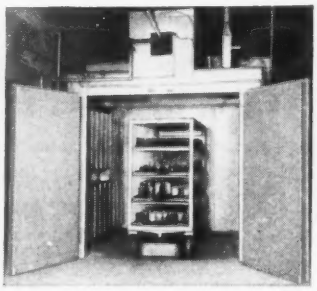
3 COMPARTMENT RACK TYPE OVEN
Uniformally heated by one compact, high capacity, air heater serving all compartments. Each compartment accommodates two core racks 4'-0" wide x 7'-0" long x 6'-0" high, loaded end to end.

Three Compartment Rack Type Oven

Lanly Car Type Oven

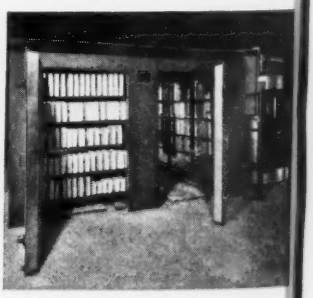


Continuous Core Blacking Oven



De-waxing Oven

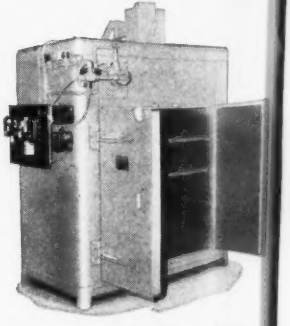
Combination Rack and Drawer Type Oven



Plaster Mold Drying Oven

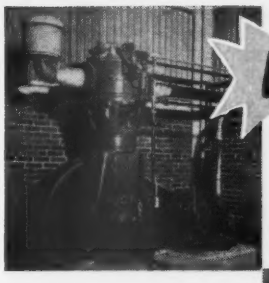
LANLY FOUNDRY OVENS
THE LANLY COMPANY • 780 PROSPECT AVE
CLEVELAND, OHIO

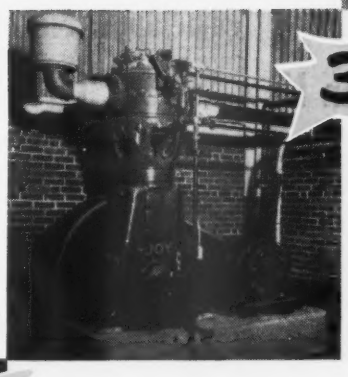
WRITE FOR THE LATEST CATALOG AND FACTS ON ANY INSTALLATION



Shelf Type Core Oven

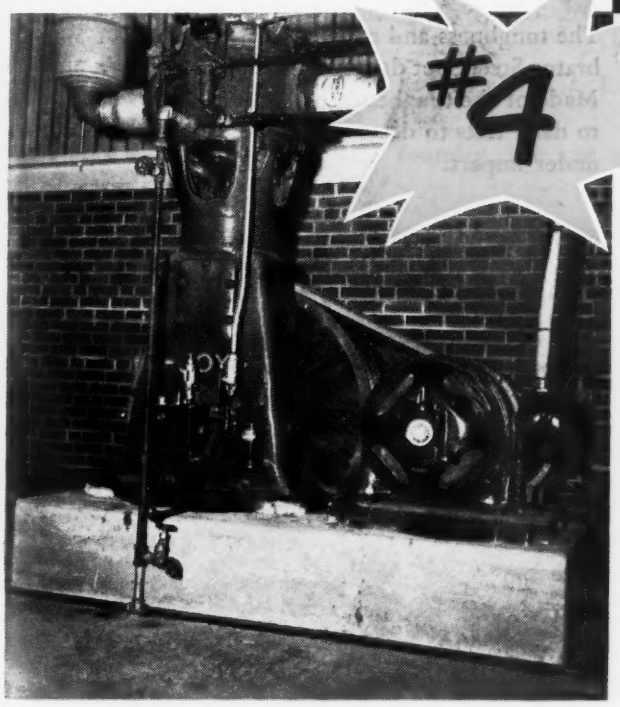
...They've added their FOURTH JOY WG-9 COMPRESSOR





Certain-teed's new Oklahoma paper mill uses compressed air in the manufacture of gypsum board papers. In addition, compressed air is used in general shop service, and it also furnishes the pressure for the ever-so-important automatic sprinkler system.

With such dependence upon air supply—24 hours a day—Certain-teed's engineers "bet on the Champ" and, for the fourth time in a row, specified a Joy WG-9 vertical compressor.



The WG-9 is a water-cooled, double-acting, single-stage compressor built to deliver medium amounts of air *constantly.* It, alone in its class, offers replaceable crosshead guides and cylinder liners, force-feed lubrication, and bearings that *never* need adjusting. As an extra bonus, "Dual-Cushion" valves are included to give higher valve capacity and better heat dissipation.

All-in-all, the WG-9 is a potent performer—able to take the measure of any compressor in its class. Get the specifications and check the record . . . you'll be convinced, too. Bulletin A-43 gives all data and will be sent upon request. ● ***Joy Manufacturing Company, Oliver Building, Pittsburgh 22, Pa.*** In Canada: *Joy Manufacturing Company (Canada) Limited, Galt, Ontario.*

15 SIZES • 30 to 150 PSI • 172 to 881 CFM

FOR OIL-FREE OPERATIONS WE OFFER THE WGO-9 SERIES

Consult a Joy Engineer

for Vaneaxial Fans . . . Compressors, Vacuum Pumps and Boosters . . . Oxygen Generators

JOY

W&D 1 4645

SPECIALISTS IN THE COMPRESSION AND MOVEMENT OF AIR AND GASES SINCE 1885

WHEELABRATOR® STEEL SHOT

19 Cont

Assur

Here's The QUALITY You Have Needed . . . And Can Now Depend Upon When You Use "Wheelabrator" Steel Shot

Photo micrograph of Wheelabrator Steel Shot magnified 500 times, showing its homogeneous structure.

1 STRUCTURE

The microstructure of shot is of primary importance to cleaning speed and shot life as well as machine maintenance life. In producing Wheelabrator Steel Shot, the chemical analysis and microstructure are rigidly maintained to assure a product which is round, solid and free from surface cracks.

2 HARDNESS

The hardness of Wheelabrator Steel Shot was determined by our experience in installing and servicing more than 6000 Wheelabrator blast machines. This hardness is uniform and is achieved by exacting control of the analysis and by double heat treatment at automatically controlled temperatures.

3 RESISTANCE TO BREAKDOWN

The toughness and native impact strength of Wheelabrator Steel Shot drastically reduces shot consumption. Made of the toughest high carbon steel, it is subjected to daily tests to determine its resistance to breakdown under impact.

4 CONSTANT UNIFORMITY

19 elaborate control checks, listed below, combined with our modern automatic equipment, assure the constant high quality of Wheelabrator Steel Shot. As a result, you are sure of receiving the same highly efficient performance of the "test run" from every shipment.

19 Control Checks for QUALITY

MELTING	POURING	FIRST SCREENING	DRYING AND CONDITIONI
1. Rigid scrap selection. 2. Preliminary carbon and manganese analysis. 3. Complete chemical analysis.	4. Accurate and continuous control of pouring temperature. 5. Accurate and continuous control of quench temperature.	6. Visual and metallographic inspection in as-cast condition. 7. Hardness check in as-cast condition. 8. Continuous inspection of screening operation.	9. Recording temp control. 10. Removal of obj able material.

SECOND SCREENING	FIRST HEAT TREATING	SECOND HEAT TREATING	FINAL SCREENING	BAGGING
11. Continuous inspection of screens.	12. Automatic control and permanent record by recording instrument of heat treat time and temperature.	13. Automatic control and permanent record by recording instrument of heat treat time and temperature. 14. Continuous tests for hardness and carbon content. 15. Continuous microscopic inspection.	16. Continuous inspection of screens and shot. 17. Daily laboratory checks of screening accuracy.	18. Continuous insp of shot. 19. Daily shot bre tests.

l Checks for QUALITY Peak Performance*

* HERE IS WHAT THIS NEW SHOT WILL DO FOR YOU

$ SLASHES ABRASIVE CONSUMPTION

A prominent Pennsylvania Malleable Foundry had an abrasive consumption of 36.458 lbs. per hour when using chilled iron as compared to only 3.234 lbs. per hour with Wheelabrator Steel Shot.

$ LOWERS CLEANING COSTS

A New York gray iron foundry reduced abrasive costs from $2.49 per hour to $1.54 per hour when they switched from chilled iron grit to Wheelabrator Steel Shot.

$ LENGTHENS PARTS LIFE

At a large Eastern steel foundry, the use of Wheelabrator Steel Shot resulted in a 150% increase in blade life with a corresponding increase in the usable life of other machine parts.

$ REDUCES MAINTENANCE LABOR

Due to the 300% increase in machine parts life resulting from the use of Wheelabrator Steel Shot, maintenance labor costs were drastically slashed at a prominent Eastern foundry. With fewer parts to replace, less time is required to keep machine in top working order.

$ REDUCES SHIPPING, HANDLING and STORAGE COSTS

It took a NEW PLANT and NEW PRODUCTION METHODS to Produce this New METALLURGICALLY - SUPERIOR STEEL SHOT

American

HEELABRATOR & EQUIPMENT CORP.

5 S. Byrkit St., Mishawaka Ind.

The ONLY Blast Equipment Manufacturer Producing Steel Shot

ELECTROMET offers you a complete line of VANADIUM products . . .

From Domestic Ores

Colorado is the principal source of ELECTROMET's vanadium ores. Domestic ores from our Corporation-owned mines assure you a dependable and adequate supply of vanadium products. Here is a drilling operation in a mine of United States Vanadium Company, a Division of Union Carbide and Carbon Corporation.

Available for Immediate Delivery

Although many alloying materials are in short supply, vanadium is readily available and can frequently be used in engineering steels to replace at least part, if not all, of certain scarce alloys.

ELECTROMET ferrovanadium is carefully packed and labeled for shipment in barrels or steel drums containing about 500 lb. of material, or in bags holding 25 lb. of contained vanadium. Close metallurgical control is maintained during every stage of manufacture from ore to finished product. This assures you products that are uniform in analysis, closely graded, correctly sized, and physically clean.

Ferrovanadium (4 Grades)	Composition		
	Vanadium	Silicon max.	Carbon max.
High-Speed Grade	50 to 55%	1.50%	0.20%
Special Grade	50 to 55%	2%	0.50%
Open-Hearth Grade	50 to 55%	8%	3%
Foundry Grade	50 to 55%	approx. 10%	3%

Vanadium Oxide (3 Grades)	Composition		
	Vanadium Oxide (V_2O_5)	Sodium Oxide (Na_2O)	Calcium Oxide (CaO)
Fused	86 to 89%	approx. 10%	approx. 2%
Sodium Polyvanadate (Red Cake)	approx. 85%	approx. 9%	approx. 2%
High-Purity	approx. 99.5%	...	...

Ammonium Metavanadate NH_4VO_3—99% min.

Our staff of experienced metallurgical engineers is always ready to furnish technical assistance in the use of vanadium. Write, wire, or phone one of ELECTROMET's offices for additional information.

The term "Electromet" is a registered trade-mark of Union Carbide and Carbon Corporation

ELECTRO METALLURGICAL COMPANY

A Division of Union Carbide and Carbon Corporation

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Electromet

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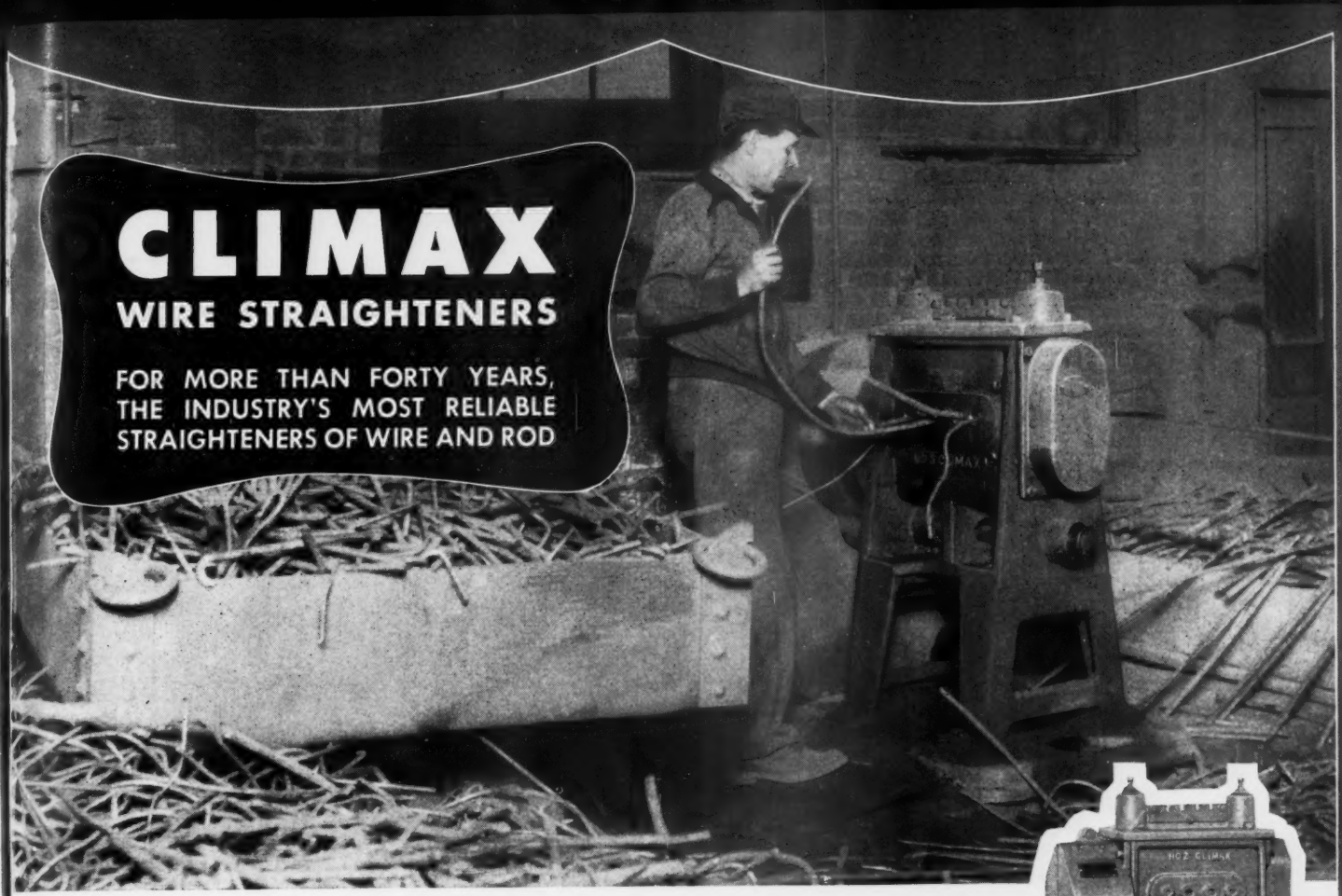
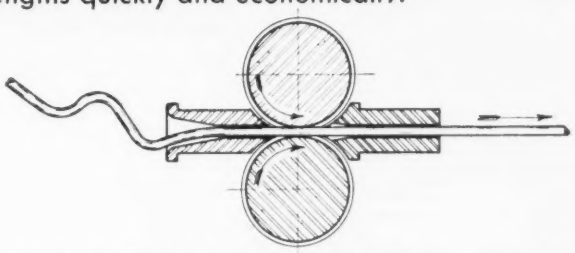
Ferro-Alloys and Metals



CLIMAX
WIRE STRAIGHTENERS

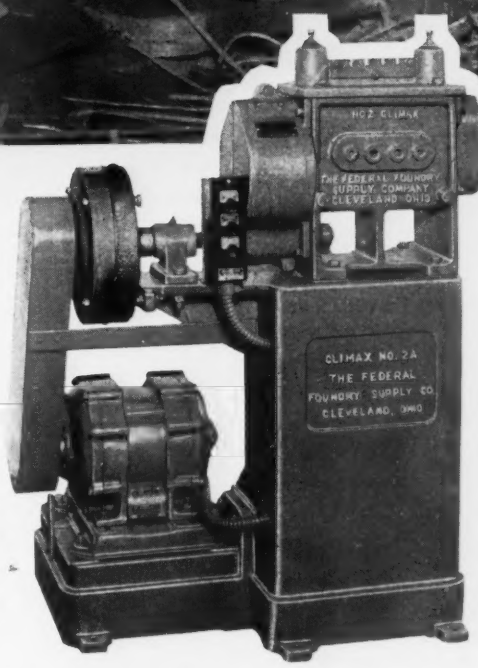
FOR MORE THAN FORTY YEARS, THE INDUSTRY'S MOST RELIABLE STRAIGHTENERS OF WIRE AND ROD

Reclaim your used core rods and wires and save money—with the CLIMAX. Operated safely and efficiently by unskilled labor. Straightens random lengths quickly and economicallv.



Bent wire is first checked in guide slots at top of the machine to determine proper feed hole, then inserted in feed hole, straightened between two heavy, alloy steel rolls under spring tension and ejected at back with a slight, natural bend, just right for core rod use.

Safety for the operator, as well as long life for the machine, is insured by enclosing gears and other moving parts. On motorized units, V-belts are enclosed and electrical wiring protected. Conveniently mounted controls and a reversible magnetic switch provide full protection for operator and straightening rolls, by enabling operator to stop or reverse machine instantly.



MODEL 2A
motorized

Handles 4 wire sizes, 1/16" to 1/4". A complete unit, ready for operation when connected to current supply.

MODELS AVAILABLE

The CLIMAX is offered in three sizes: to handle 4 wire sizes from 1/16" to 1/4"—4 sizes from 3/16" to 1/2"—and 5 sizes from 1/4" to 3/4". Each size may be furnished in three styles, as follows:

(1) Completely motorized—ready to operate.
(2) With gear reduction unit for your motor.
(3) With extended shaft for your own drive.

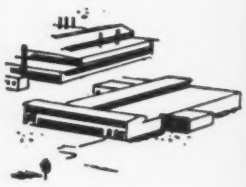
Write for additional information and prices, specifying wire sizes and model style.

FEDERAL

The **FEDERAL FOUNDRY SUPPLY** *Company*

4600 EAST 71st STREET, CLEVELAND 5, OHIO

CROWN HILL, W. VA. · CHICAGO · CHATTANOOGA · DETROIT · MILWAUKEE · NEW YORK · RICHMOND · LOS ANGELES · UPTON, WYO.



Knight Services include:

Foundry engineering

Survey of facilities

Architectural Engineering

Construction Management

Modernization

Mechanization

Materials Handling

Production Control

Cost Control

Industrial engineering

Wage Incentives

Organization

Management

Are you making the best use of your facilities and your manpower?

Today's keener competition emphasizes the need for higher quality production with fewer man-hours per unit. A comprehensive study of facilities and methods with little capital expenditure frequently permits substantial cost reductions.

Knight Engineers have made many such studies and will be glad to discuss your particular problems at no obligation. Whatever your foundry problem, you'll benefit by the broad experience of the Knight organization which has successfully completed more than 200 foundry assignments. For prompt attention, call our Chicago or New York office.

Write for copy of "Modernization without Mechanization."

EVIDENCE OF EXPERIENCE

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Management, Industrial and Architectural Engineers

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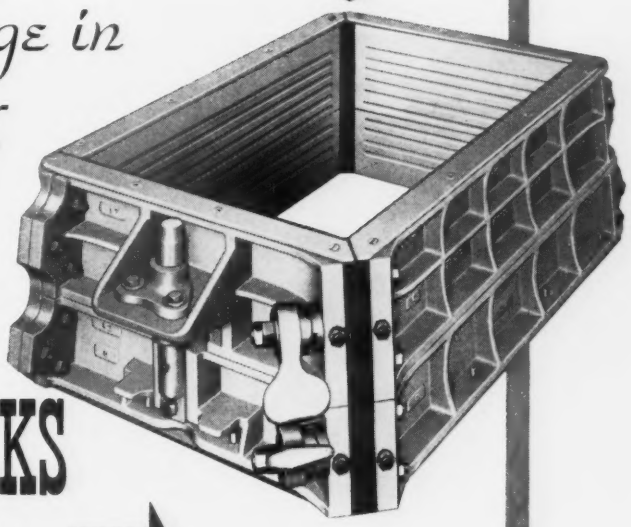
No Sand Can Lodge in Open Corners of

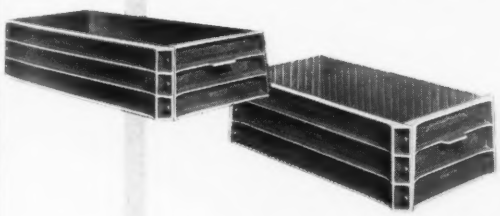
FREMONT SPREADLOCK FLASKS



—the corner gaps are completely closed by long-life, easily replaceable, live rubber corner inserts.

That's just one of the many reasons for the popularity of this new flask. Made of magnesium, which has twice the tensile strength of aluminum, they afford much longer service. Furthermore, magnesium weighs ⅓ less than aluminum, so they are easier to handle.

But more importantly, the accurately machined inside surfaces and flanges, and steel-faced top and bottom flanges assure more exacting work.



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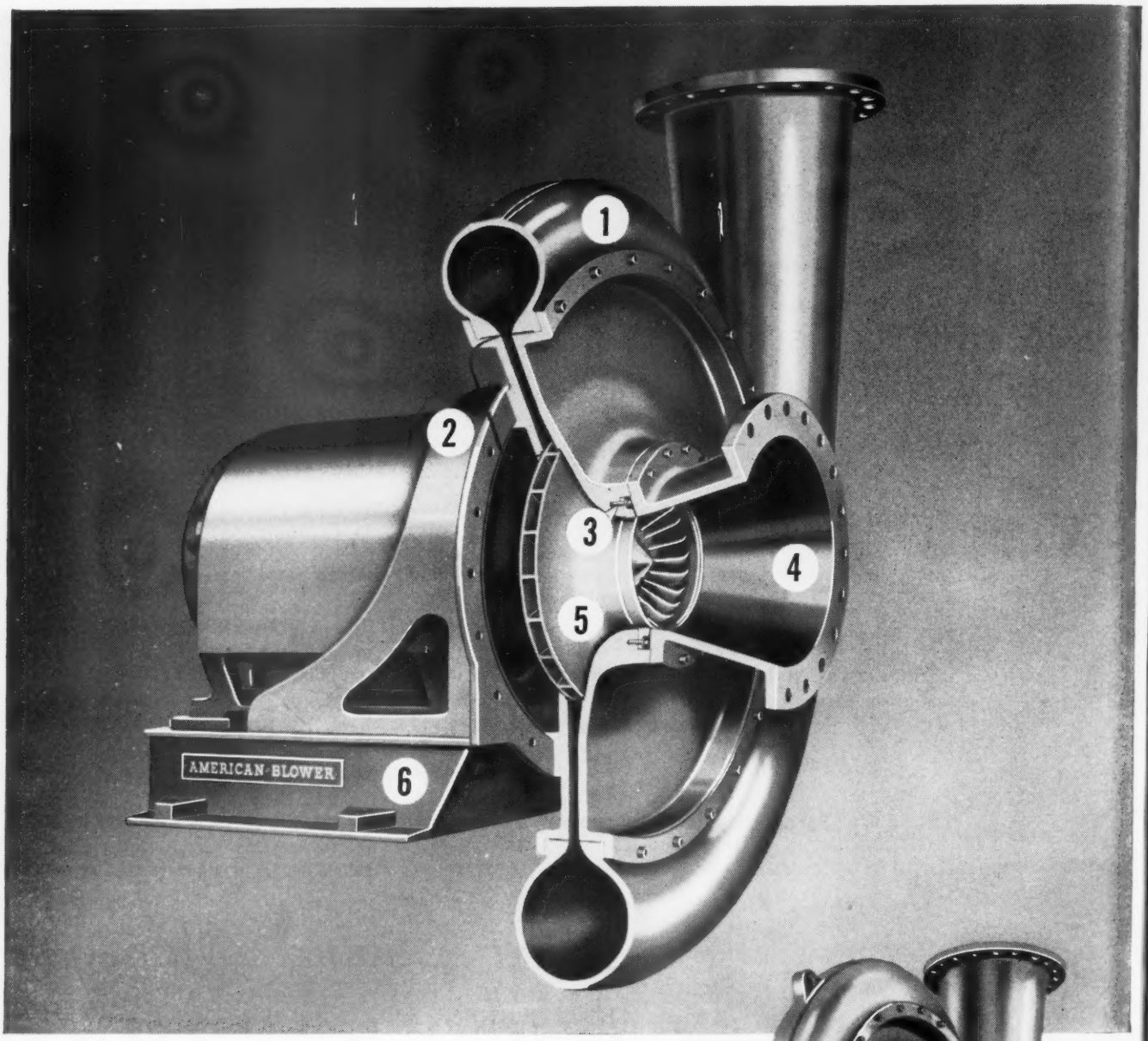
New sides or ends may be easily inserted because of the precision machined and drilled, bolted corner construction. It is no longer necessary to scrap entire jackets. The standard style is designed for ordinary foundry practice, while the grooved style, which permits ready gas escape, is ideal for steel foundries. Flasks and jackets can be assembled on 3°, 4° or 5° taper.

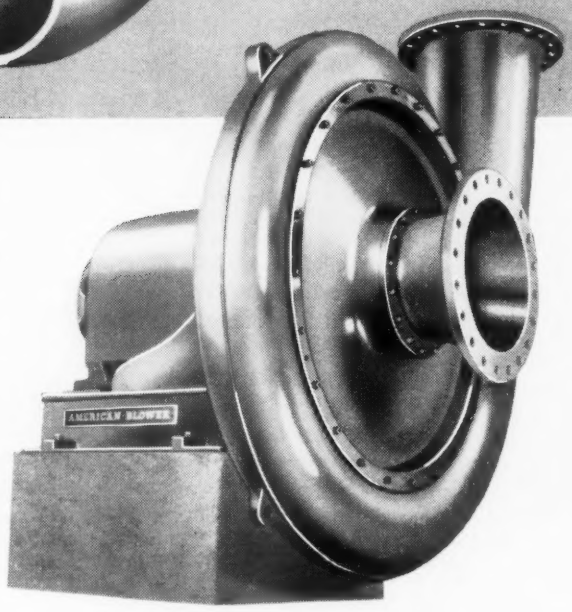
THE FREMONT FLASK CO.
Fremont, Ohio

Write today for free literature and prices on Fremont Spreadlock Flasks, Fremont Standard Slip Flasks (with the GROOV-LOCK FOOLPROOF PIN,) and Fremont Cast Iron or Cast Aluminum Jackets. All orders given prompt attention.

American Blower...a great



In cutaway view above: (1) Improved scroll-shaped casing design results in increased compressor efficiency. (2) Unobstructed, long diffuser passage converts velocity energy into pressure; provides quiet operation. (3) Annulus packing minimizes recirculation of gas around impeller inlet. (4) Removable inlet nozzle assures accurate alignment of annulus packing when assembled with impeller. (5) Aero-dynamic design of impeller blades results in high efficiencies, long life. (6) Welded steel baseplate is "stress relieved" prior to machining—assuring maintained alignment.



name in air handling, *offers you*

An outstanding line of centrifugal compressors

Single stage design. Sizes from 30 to 600 HP.
Pressures from 1¼ to 3¾ lbs.

If your job calls for delivery of large volumes of air or gases, dependable American Blower Single Stage Centrifugal Compressors are just the ticket.

They're compact, require minimum foundations, are adaptable to all types of drives — electric motor, turbine or engine.

Except for the bearings, no other parts come in contact with each other — holding maintenance to an absolute minimum. Air or gases do not become contaminated since no internal lubrication is required.

Prior to shipment, each American Blower compressor is thoroughly tested in accordance with the A.S.M.E. Power Test Code for Centrifugal Compressors and Exhausters.

If you'd like complete, concise technical data, consult the nearest American Blower Branch Office or write us for Bulletin 109.

Whether you need equipment for heating, cooling, ventilating, air conditioning, vapor absorption, fume removal, dust collecting, mechanical draft, heat transfer or smooth power transmission thru Gyrol Fluid Drives — American Blower manufactures a complete line of products to meet your requirements. Helpful technical literature is available on each product.

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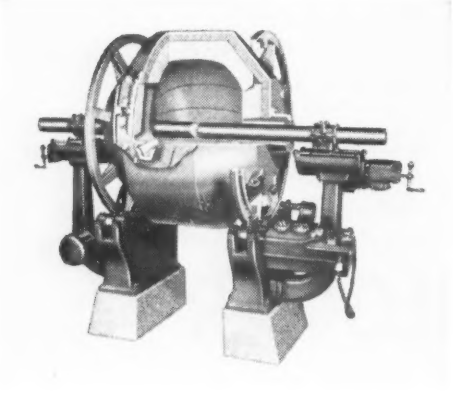
13

DETROIT ROCKING ELECTRIC FURNACES

. . . with 11,000 lbs. capacity

MELT BRASS AT



Cutaway view of Detroit Rocking Electric Furnace, showing engineering and construction features.

The first Detroit Furnace was chosen for the Crane Co. production team in 1924. It has been joined, over a 29-year period, by twelve more Detroit Rocking Electric Furnaces. The thirteen, having a combined capacity of 11,050 lbs., melt tons of brass required in daily production of the many Crane products cast in brass, bronze and Monel.

Detroit Rocking Electric Furnaces are producing high quality melts of ferrous and nonferrous metals in hundreds of foundries, making products of all kinds. Service records of twenty and more years for these furnaces are not at all uncommon.

DETROIT ELECTRIC

KUHLMAN ELECTRIC COMPANY

Foreign Representatives: in BRAZIL—Equipamentos Industrias, "Eisa" Ltd., Sao Paulo; CHILE, ARGENTINA, PERU and VENEZUELA: M. Castellvi Inc., 150 Broadway, New York 7, N

Four Type AA, 250 Kw., 1500 lb. capacity Detroit Furnaces at Crane Co. There are nine other Detroit Furnaces in use by this company

CRANE CO.

Great advantage of Detroit Rocking Electric Furnaces is the ability to produce melts of exactly uniform analysis time after time and day after day. There's no carbon pick-up from the indirect arc and the rocking action assures homogeneity in every pound of the molten metal.

These furnaces are engineered for economical operation, securing most complete use of generated heat because the molten metal washes back and forth over the lining.

Once the most efficient operating cycle is determined, the Detroit automatic controls will repeat the cycle for each melt. Fast, uniform, precisely controlled melts follow one after the other, with less metal shrinkage, more usable metal per melt, more heats per day.

Another Detroit economy—shells are easily replaced, thus cutting out-of-production time to a minimum.

If you have a metal-melting need, ask our engineers to work out your problem. Outline your requirements and let us show you what a Detroit Rocking Electric Furnace can do for you. Capacities from 10 to 4000 lbs. Write today!

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BAY CITY, MICHIGAN

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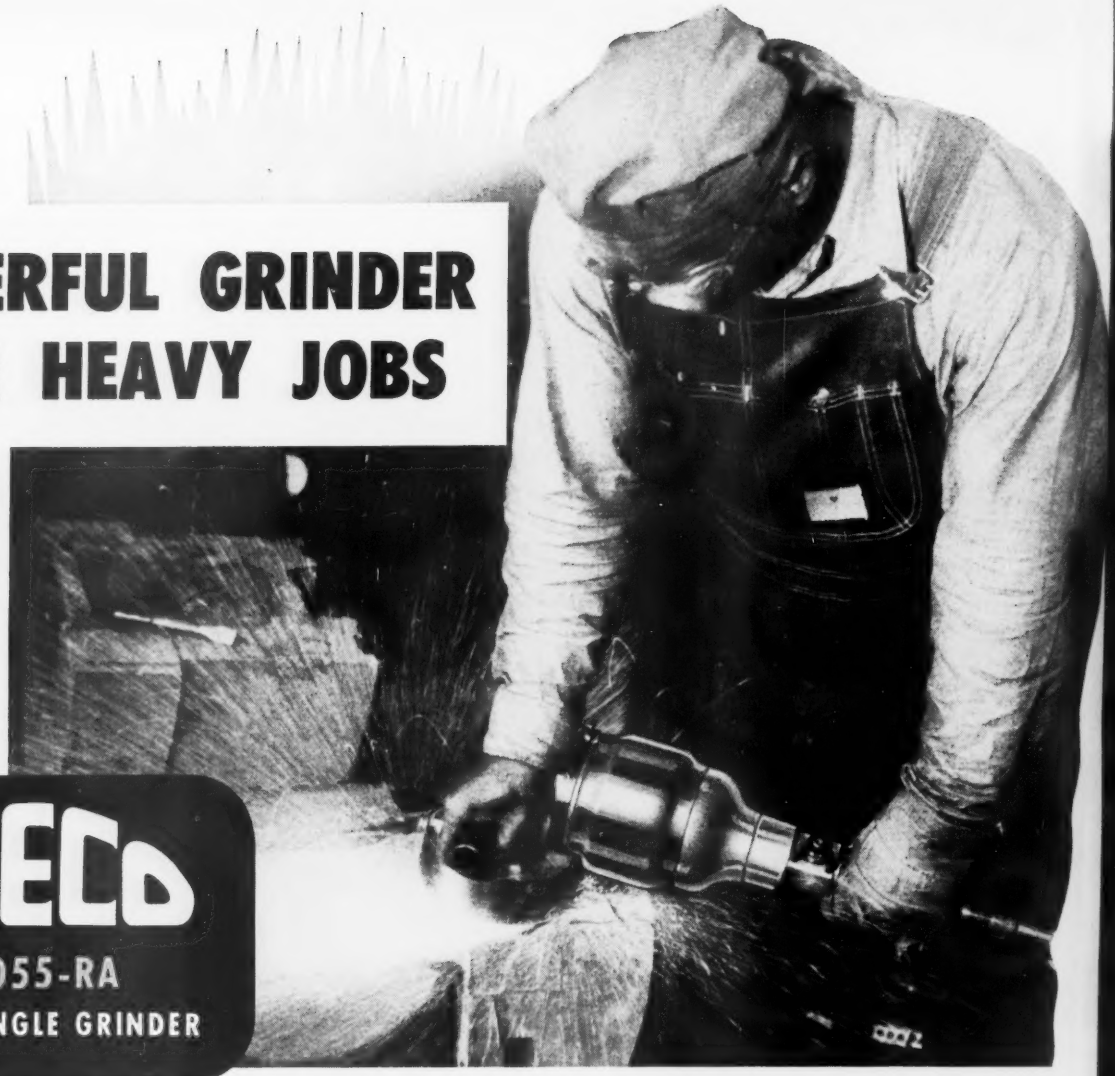
POWERFUL GRINDER FOR HEAVY JOBS



CLECO
5055-RA
RIGHT ANGLE GRINDER

This big, powerful grinder is ideal for heavy jobs. Its high power output and air-operated governor insure sustained operating speed—even under loads that would stall most grinders.

The Cleco 5055-RA is recommended for use on large castings, ship propellers and for cleaning heavy welds. On one job, for example, a heavy flame weld was normally chipped and then ground, the operation took 1½ to 2 hours. With the 5055-RA the chipping operation was unnecessary and the grinding took only 15 minutes.

If you have heavy work, write us and a Cleco representative will make an on-the-spot demonstration at your convenience.

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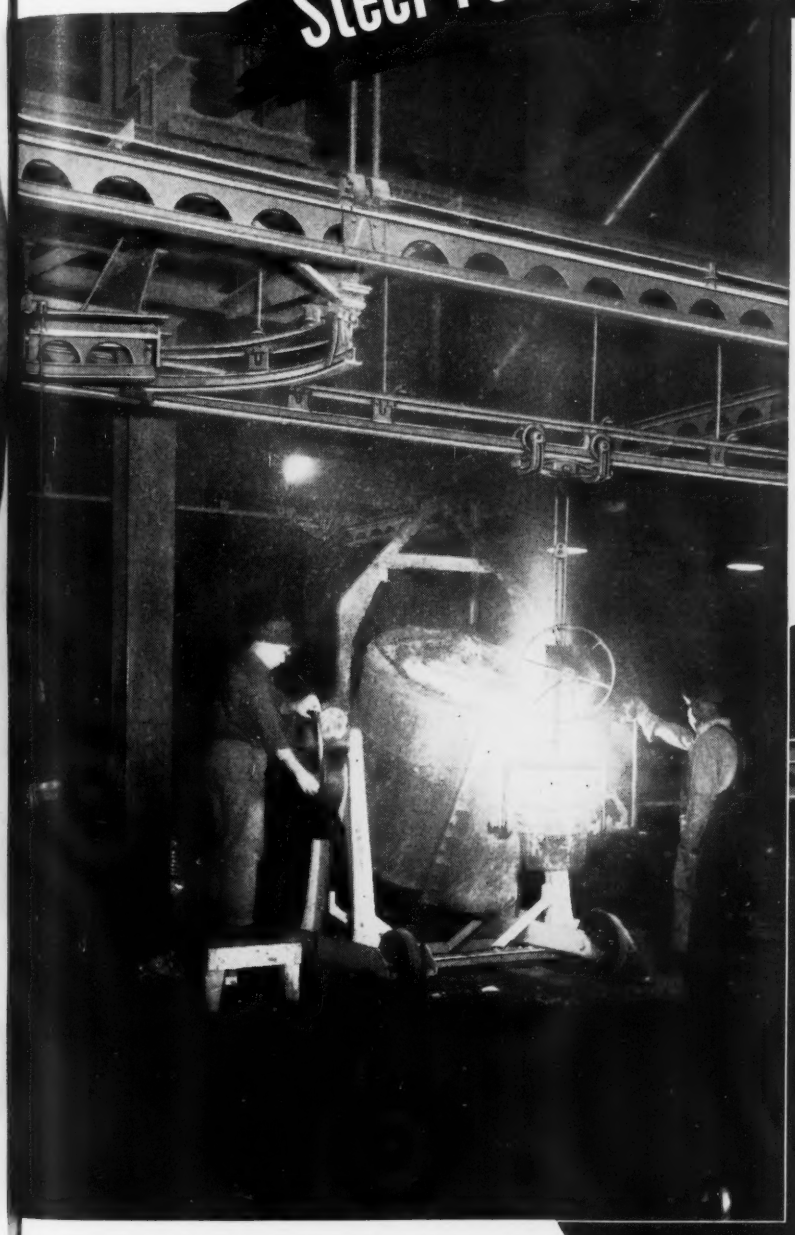
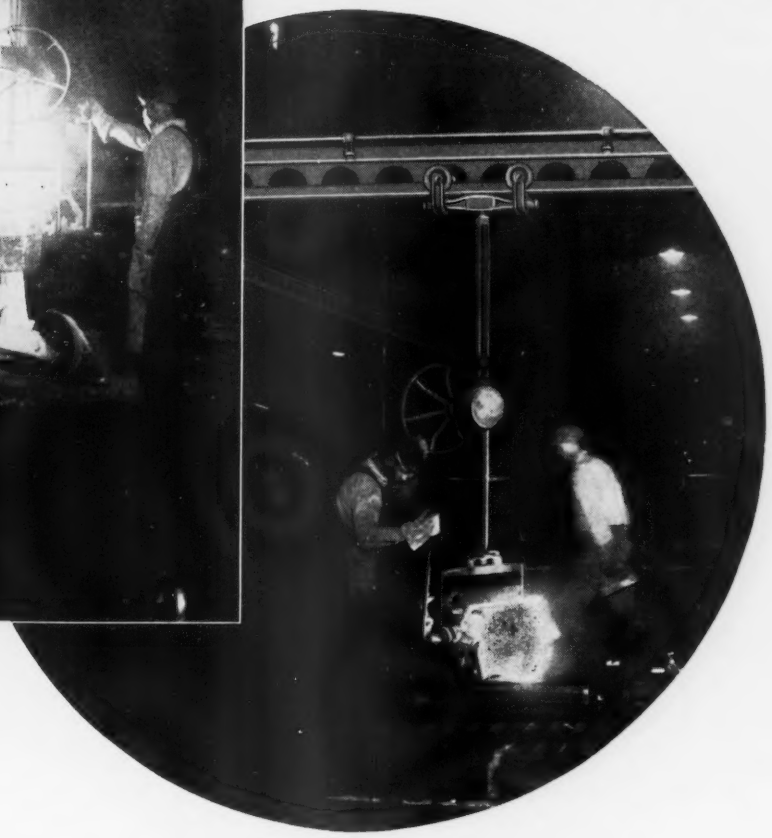
Steel Foundry *Cuts Production Costs*



Not only has Cleveland Tramrail been an important factor in speeding production and lowering costs in a large Michigan steel foundry, but it has eased the work for the employees and aided their safety.

Because of the gratifying experience with the original equipment installed in 1936, more has been purchased every ensuing year. Today Cleveland Tramrail equipment provides handling coverage for the entire pouring floor, the large cleaning department, and will be found in every section of the plant.

This progressive foundry (name on request) is fully convinced of the many advantages that can be secured with Cleveland Tramrail equipment.



In nearly every instance, each of the many installations of Cleveland Tramrail at this foundry, paid for itself within the first six months of operation.

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Moldable Exothermic Compound

MAKES YOUR RISERS WORK OVERTIME

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YOU SAVE MONEY

YOU SAVE LABOR

FOSECO FEEDEX gives you a sound casting with a small residual feeding head, as shown above. To obtain a sound casting without FEEDEX, a large, metal-wasting feeding head is required — as also shown. FEEDEX is a moldable heat producing compound for automatic feeding, and promotes progressive solidification. Mix with water, mold into desired shape, bake dry, insert into mold.

MAKE YOUR OWN TEST!

Write today for a 100 pound trial order and complete information.

FOSECO FEEDEX #3 — for iron and steel
FOSECO FEEDEX #4 — for non-ferrous alloys

If you have a special problem, tell us about it — we'll be glad to be of help.

FOUNDRY SERVICES, Inc.
280 Madison Ave., Dept. F
New York 16, N. Y.

Readers' Comment

Labor Supply Problem Neglected

TO THE EDITORS:

For the past 12 years there has been a matter of grave importance to the foundry industry which has been very badly neglected. It is the continual declining interest of young men in learning the foundry trade.

Today, there are fewer really skilled molders than ever before in the foundry history. It seems to me that today the molding trade is about the only good trade or profession that is not already overcrowded, and that the future interest of any young man learning this trade will be best served in the foundry. I therefore feel that your magazine would be doing a very great service to the foundry industry if you could create some kind of a nationwide interest along this line.

With the help of various foundry societies throughout the country in some nationwide advertising campaign explaining the advantages of learning this valuable skill, it is possible we may be able to rebuild this valuable source of skilled personnel for the foundry industry. If not, and with the present trend with all the real old skilled mechanics retiring and passing on with no new ones to replace them, I dread to think of the situation the foundry industry will be faced with in the next five to seven years.

NORMAN B. KAUFFMAN

Kauffman Mfg. & Supply Co.
Hagerstown, Md.

* * *

Scared of Big Bad Cupola

TO THE EDITORS:

The attitude of many men, perhaps the majority, in gray iron foundries toward the cupola is strangely similar to the attitude displayed by the so-called heathen toward the figures of wood and stone and metal which they fabricate, set up and then calmly endow with supernatural and mystical powers.

A certain number regard them with awe and admiration. They develop and pratice a ritual and a ceremony full of strange movements and gestures. They jealously resent any comment from an outsider, particularly if the comment is in the form of an inquiry as to why they do thus and so. These are the professionals, the favored few who are allowed to touch the body and therefore presumably are numbered wit the elect who know all things an from whom nothing whatsoever hidden. The remainder of the gan heathen and foundry—and in som instances even a missionary could no tell them apart—regard the object a wonderful and mysterious.

Comes a day, in the argot of th West coast, when the high priest— the cupola tender—fails to report fo duty. A deputy hurriedly is elected and told to do his best. Unless h has had extended former experienc he is so overwhelmed with awe tha inevitably he forgets some item i the established routine. Instances ar on record of men who forgot to pla any sand on the bottom doors, an mud on the walls, any wood und the coke, or any coke under the iro

These and many other "accidents could be avoided if foundrymen fami iarized themselves with cupola mel ing technique. At one time when a information — and misinformation — was transmitted by word of mout ignorance of cupola practice was ex cusable. Under modern condition with the subject constantly discusse in the technical press, at foundr meetings and with several excelle textbooks available, the cupola shou present no mystery to any perso seeking knowledge on this phase foundry practice.

A RETIRED CUPOLA TENDE

* * *

Passing Around the Credit

TO THE EDITORS:

I have been going over the Jun issue of FOUNDRY and found "Wit the Editors" very interesting.

I was especially pleased that yo tied my name with that of John Grennan in referring to the Old Timers. John was my most faithful and helpful pal in my earlier days in staging the convention meetings. He was always on the job and did all the de tail work needed around the meeting rooms, getting projectors, screens etc., in place. All this with only m gratitude for compensation.

Then I was pleased that you re ferred to Ray Messinger and his earl advocacy of chapters. I made a thor ough search of *Transactions* an could find no earlier word on th subject, so we can credit Ray wit the vision of the chapter idea.

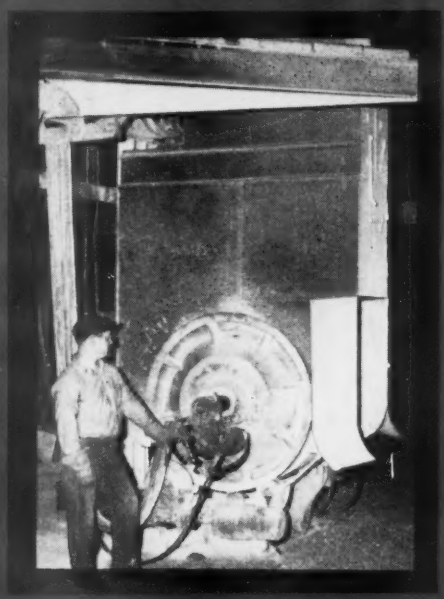
ROBERT E. KENNED

University of Illinois
Chicago 11

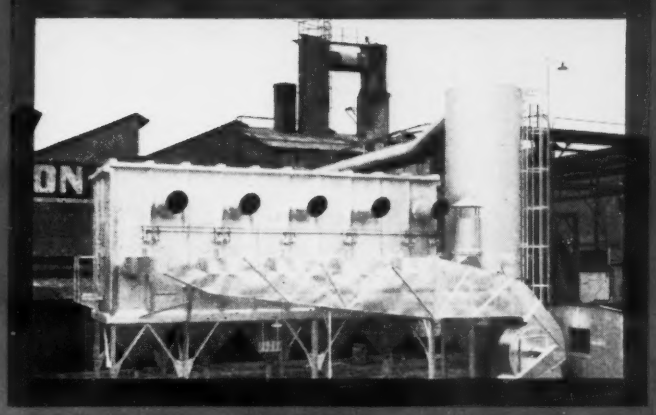
new!

efficient, automatic fume control

for all types of furnaces . . .



electric furnace fumes



cupola fumes

with DUSTUBE collectors

Air pollution from cupolas and other furnaces can now be prevented at a reasonable cost. Dustube Fume Control systems provide virtually 100% removal of fume, discharging only clean gas to the atmosphere.

Operation of Dustube systems can be continuous and automatic. No manual labor is required and no delays are experienced for shaking down the collected fume. Because of their simple design, Dustube Collectors cost less to install, operate and maintain than other types of fume control equipment.

Typical Examples

At the Jeffrey Manufacturing Co., valuable zinc oxide is recovered in a Dustube Collector from the gases released by an electric furnace. Highly efficient recovery prevents fumes from escaping into the atmosphere.

At Lincoln Foundry Corp., a Dustube Collector system has eliminated the discharge of solids from the Cupola. A certificate of approval, without restrictions, from the strict Los Angeles County Air Pollution Board attests to the high efficiency of the system.

Send today for descriptive literature on Dustube Fume Control.

American WHEELABRATOR & EQUIPMENT CORP.

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Rolled Steel Flasks . . . Produce Better Castings . . . Cost Less Per Year

Sterling Style "ASU" Flask, with loop handles instead of standard flat handles.

A Leading Brake Shoe Manufacturer Specifies STERLING ROLLED STEEL FLASKS

The American Brake Shoe Company, operating plants in principal cities of the United States and Canada, discovered that it pays to replace cast iron flasks with Sterling Rolled Steel Flasks. At present, this internationally famous manufacturer has 30,560 sections rolling along the conveyor lines. Additional Sterlings are on order. Surely, these figures are significant. Sterlings were selected because they are engineered and built for a long service life. They provide a practical combination of maximum strength with minimum weight. Each rolled steel section, equipped with welded fittings, forms a solid rigid piece. The sand flanges at the top and bottom of each section have fillets so that sand will pack under flanges. A heavy reinforcing rib is rolled in the center of each section to resist tortional and other strains. All flanged surfaces are machined. These life-prolonging features enable foundrymen to produce better castings at a lower cost per casting. Get the facts. Write today for new Sterling Catalog just off the press.

STERLING WHEELBARROW CO., Milwaukee 14, Wis., U.S.A.

Sterling

Pioneers in the Manufacture of Foundry Flasks

A 7442-1PC

How's Your Quality Rating?

Have you ever felt rather discouraged and disgruntled with the quality of a manufactured article you may have purchased? Did that new automobile measure up to advance billings, or did you encounter rattles, scratches, improper assembly, mechanical failure or other imperfections that required frequent conferences with a not too interested "service" manager?

Did the automatic washer refuse to be automatic until the "service" man had made several calls? Did the new suit start to come apart at the seams on about the first wearing? How often have you wondered if, in the process of developing mass production, we may have lost sight of the importance of quality?

Frequently we hear buyers of castings complain about the quality of cast products received from some foundries. Perhaps their reaction is much the same as yours in this matter of quality. They can see no reason why castings having any type of defect should ever leave the foundry and be delivered to the customer. And perhaps they are correct in this contention.

The foundry industry has reached the point of development where it should be possible to keep production of defective castings at a very low point. We have the know-how based on years of experience and strengthened by the heat of unusual demands during two emergency periods. We have marvelous machines that remove many variables that at one time were attributed to the human factor. We have good raw materials, excellent supplies and relatively new additives that enhance the probabilities of a quality product. We know so much more about metallurgy and the chemistry of melting. And we have developed excellent quality controls, including proper inspection. Therefore, why should defective castings reach the customer?

The time is not far away when customers will demand and get quality in any manufactured product. It may be that only those companies providing quality will be able to sell their products in sufficient quantity to provide profitable operation.

As a matter of insurance, why not take a good look at your own operations, and see if your customers are satisfied with the quality of your product?

Frank G. Steinbach

Editor

Pearlitic Malleable Castings

By H. E. STEINHOFF
Vice President
and LYLE JENKINS
Metallurgist
Wagner Malleable Iron Co.
Decatur, Ill.

WAGNER MALLEABLE IRON CO., Decatur, Ill., established in 1917, produces both malleable and pearlitic malleable castings. It has recently completed a thorough project of mechanization and modernization of its foundry and machining facilities in the interest of improved working conditions and quality of product.

Commercial production of pearlitic malleable castings began in November, 1951, following exhaustive experimentation and research. Production during the first four months of 1953 tripled the output for the entire year of 1952.

Most of the pearlitic malleable business was developed by conversions from competitive materials—and ranges from rocker arms weighing ½-lb to transmission and other parts weighing up to 11 lb.

Metallurgical controls and modern production methods and facilities assure uniformity and quality of product. The melting operation is a duplexing process. Furnaces for heat treating are radiant-tube, gas-fired, with controlled atmosphere.

By improved practices and by chemical analyses made at regular frequent intervals, uniform composition of the molten metal is achieved.

In the processing of malleable and pearlitic malleable castings the composition of the molten metal is the same—only the heat treatment differs. First stage graphitization is the same for both. Some of the carbon is retained in combined form in the pearlitic process by arresting heat treatment following first stage graphitization.

In our method of producing pearlitic malleable castings, mild steel containers 24 in. in diameter and 18 in. high are loaded to about 500 lb., placed on tubular alloy trays and transferred to the charge vestibule of a controlled atmosphere, radiant-tube, gas-fired, pusher type annealing furnace, four rows wide and 29 rows long, which is designed for the production of either malleable or pearlitic malleable.

Castings are covered with a close-fitting lid to prevent surface decarburization, and are heated at a temperature of 1550° F for 4 hours, raised to and held at 1750° F for 13 hours, cooled to 1700° F in 3 hours and further cooled to 1650° F for 2 hours to complete first stage graphitization, which requires about 22 hours. A push of four containers is made every 45 minutes.

At the end of the first-stage graphitization a row of four containers of castings aggregating approximately 2000 lb is removed from the furnace at a temperature of 1650° F by the discharge vestibule car. An electrically operated forked rollover mechanism removes the trays and loaded containers from the platform of the discharge vestibule car and revolves partially to discharge the castings onto a 4½ x 10-foot shaking pan feeder. This feeder and an adjustable gate regulate the depth and distribution of the castings uniformly onto a 10-ft-wide by 35-ft-long traveling mesh belt cooling conveyor, the speed of which can be adjusted. This mechanism is shown in Fig. 1.

This conveyor is entirely hooded to distribute 133,000 cubic feet of outside air per minute uniformly over its 350 sq ft area to cool the product rapidly through its critical range of temperature. The cooling rate is rapid enough to produce a fine-grain pearlite, but not drastic enough to cause cracking or severe distortion. Approximately 90 seconds elapses from the time the castings start to leave the discharge vestibule of the furnace until they are distributed onto the cooling conveyor.

Fig. 2 is a microstructure of a specimen after air quenching and shows the temper carbon nodules in a matrix of fine-grain pearlite which is uniform throughout its cross section and contains no martensite or intermediate transformation products. Fig. 3 shows the uniformity of hardness throughout the cross section of test cylinders of various diameters which were air quenched and tempered.

The absence of a decarburized rim at the surface, illustrated in Fig. 4, is an essential property for surface hardening unmachined castings.

Effective rapid cooling through the critical range of temperature is accomplished by distributing the castings uniformly in a thin layer over the cooling conveyor and subjecting them to an intense blast of air which produces a product with a uniform hardness at about 341 bhn.

After the air quench, castings are discharged by the conveyor into an alloy basket shown in Fig. 9

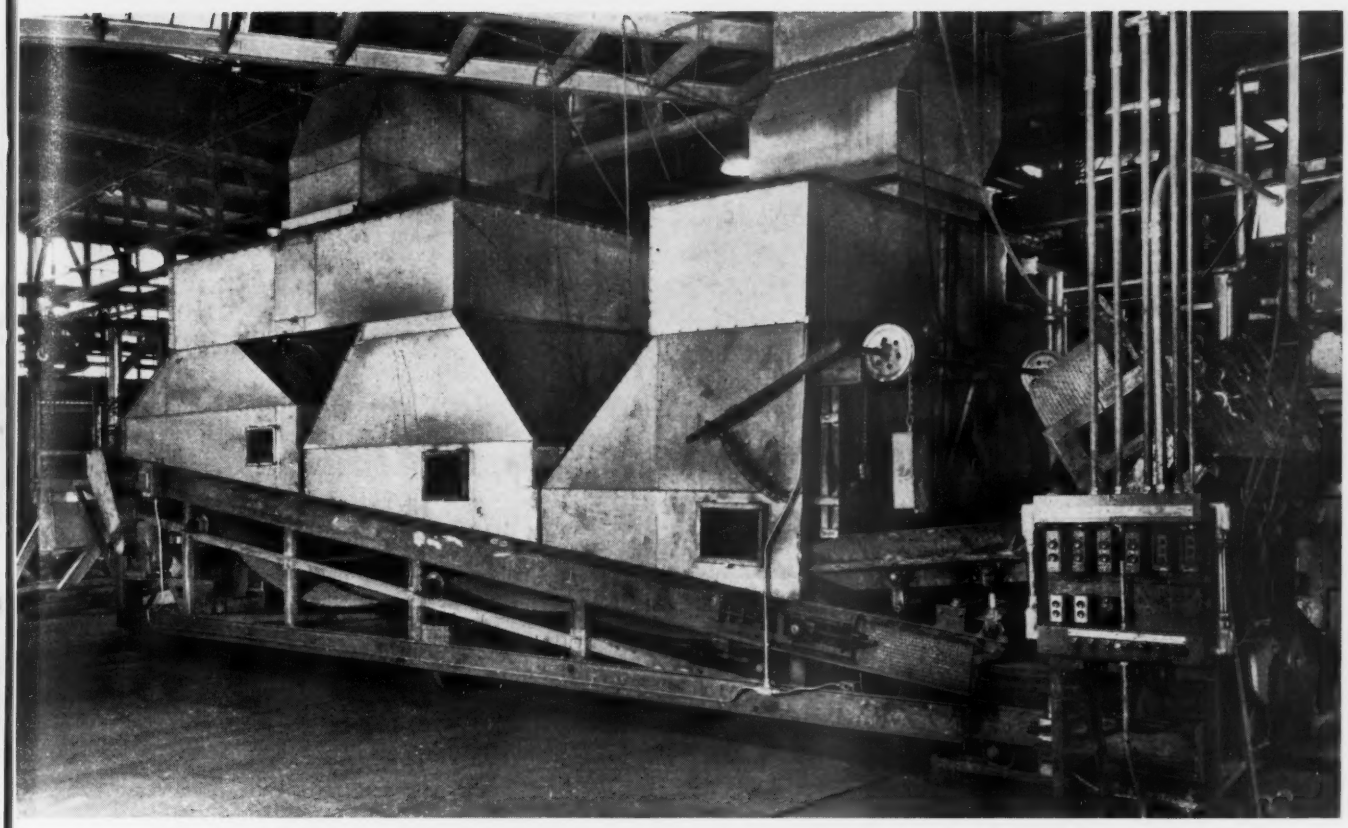


Fig. 1—Cooling conveyor receives castings after first-stage graphitization. This hooded unit cools castings rapidly through critical range

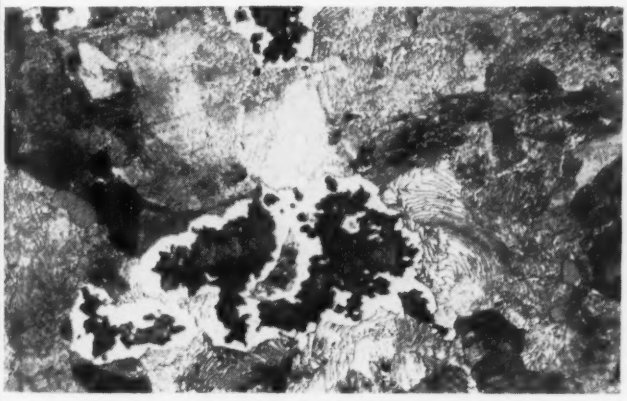


Fig. 2—Microstructure of specimen after air quenching. Specimen was taken at midradius. 500X Bhn 341

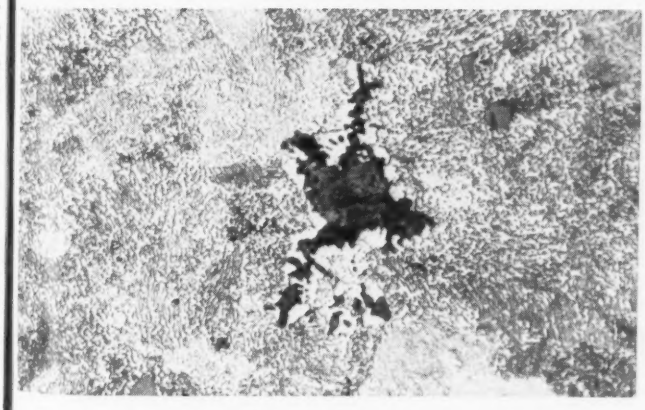


Fig. 4—Showing absence of decarburized rim at 0.006-in. from surface. Tempered 3 hr at 1250°F

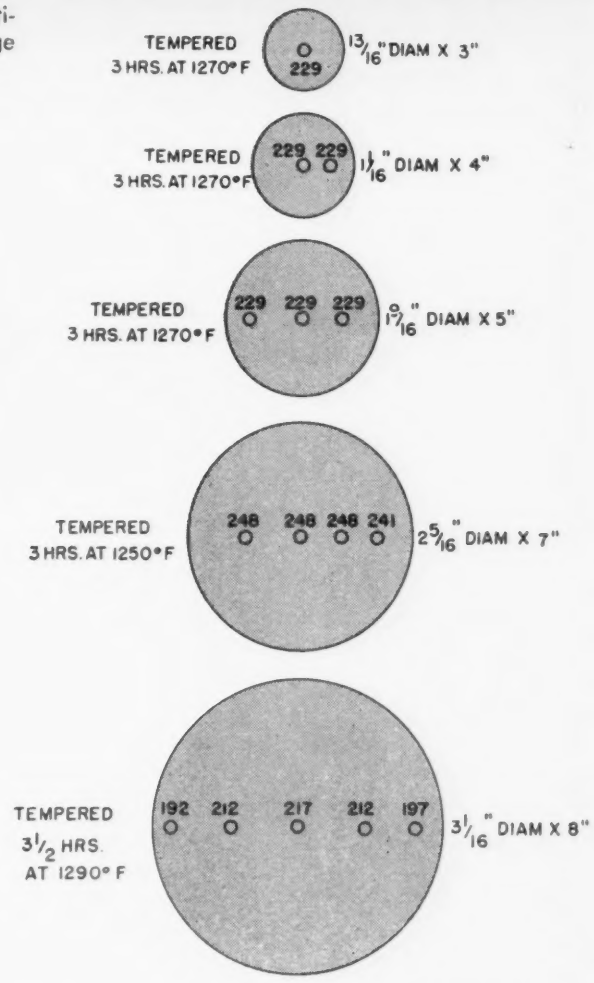


Fig. 3—Air-quenched pearlitic malleable cylinders. Taken on a ½-in.-thick cross section through the center of each cylinder. Bhn shown on the figures

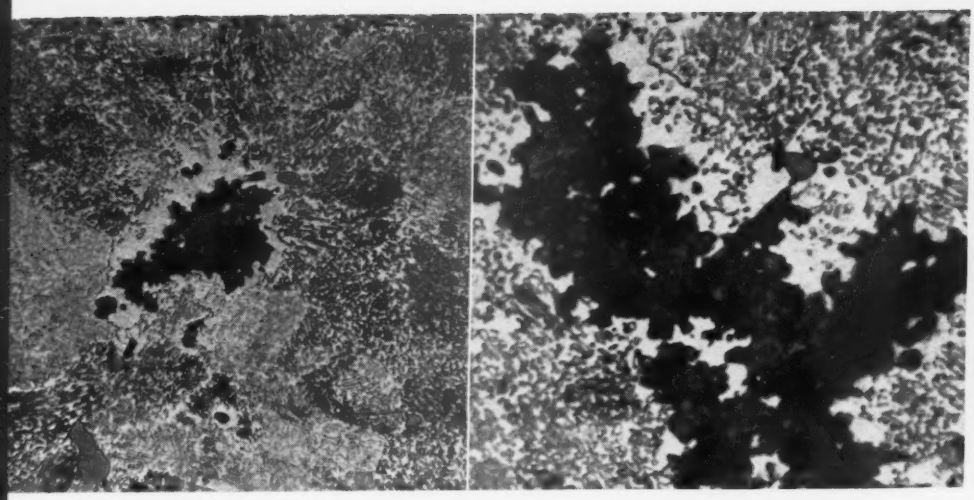


Fig. 5—Microstructure of casting tempered 3 hr at 1250°F. Bhn 255. Magnification at left 500X; that at right 1000X

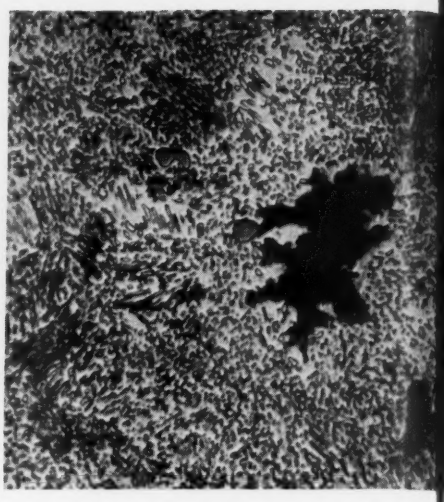


Fig. 6—A casting tempered 3 hr at 1270°F. Bhn 241. Magnification 500X

TABLE I—ASTM Specification for Pearlitic Malleable

Grade	Min Ult Tens. Str, psi	Min Yld Str, psi	Min Elong, %	Brinell Hardness	Applicable Specs. and Grades* ASTM	U.S. Army	Army Ord	Navy
43010	60,000	43,000	10	163–207	A220–50	x	AXS–623–C E	x
48005	70,000	48,000	5	179–228	A220–50	x	x	x
53004	80,000	53,000	4	197–241	A220–50	x	AXS–623 B&D	x
60003	80,000	60,000	3	197–241	A220–50	x	AXS–623 A&C	x
70002	90,000	70,000	2	241–285	A220–50	x	x	x

* SAE specification is same as ASTM

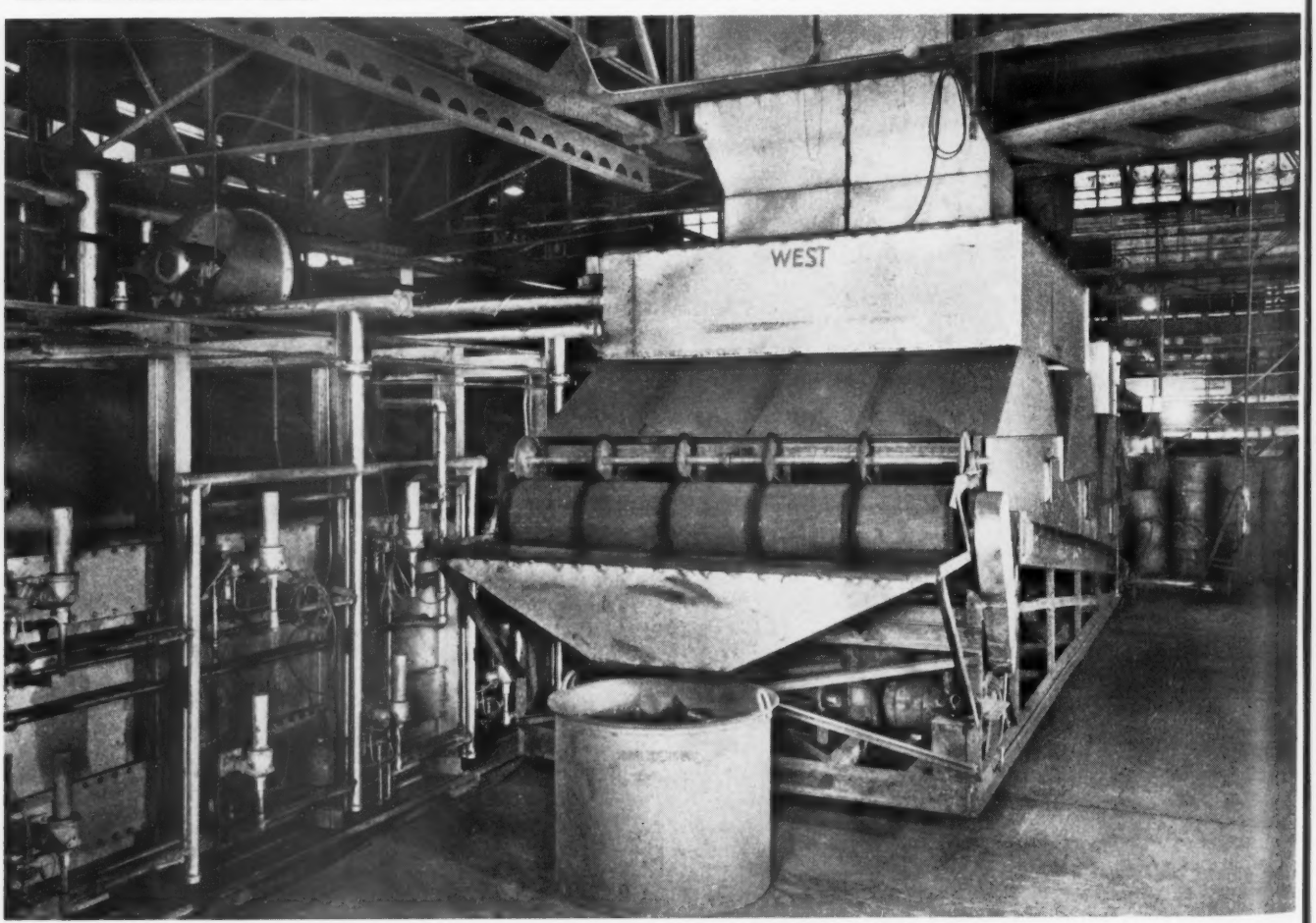


Fig. 9—Air-quenched castings are discharged by the cooling conveyor into an alloy basket holding about 3000 lb. Convection draw furnace tempers castings to required hardness and relieves residual stresses

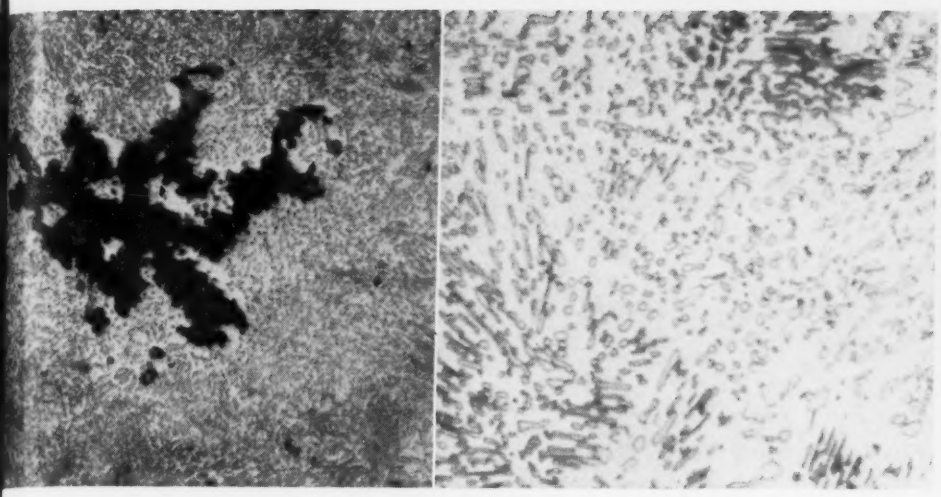


Fig. 7—Showing microstructure of a casting tempered 3 hr at 1290°F. Bhn. 229. Magnification at left 500X; at right 2000X

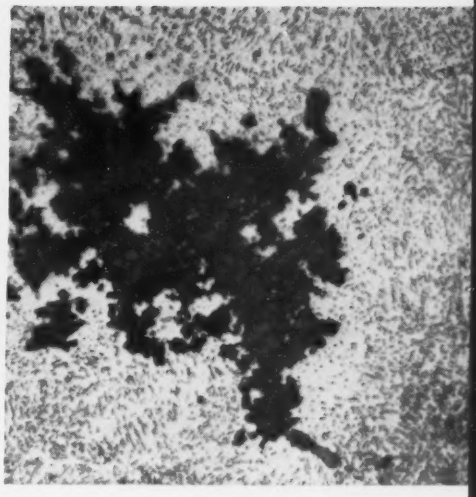


Fig. 8—Tempered at 1290°F for 3½ hr. Bhn 217. 500X

which is loaded to about 3000 lb and tempered to customers' hardness specifications to meet specific needs and to relieve residual stresses in a gas-fired recirculating type convection draw furnace.

The heat circulating feature of the draw furnace assures uniform tempering of the finished product. All castings, regardless of location in the charge, are uniform in hardness.

The amount of combined carbon retained and the form of its distribution account for the difference in the properties of the various types and grades of pearlitic malleable. A high percentage of combined carbon produces pearlitic malleable in the harder range with resulting higher tensile strength and lower elongation.

By control of tempering operations, ranges of hardnesses are developed to provide physical properties to meet specific needs of customers.

ASTM Specification A220 lists five grades of pearlitic malleable, as shown in Table I.

Repeated tests of pearlitic malleable produced by the improved techniques and controls herein described demonstrate that the mechanical properties exceed the minimum values in the corresponding range of hardness covered by these specifications.

Fig. 5 shows the microstructure of a casting which was tempered for 3 hours at 1250° F. It has a brinell hardness of 255.

Fig. 6 shows the microstructure of a casting which was tempered for 3 hours at 1270° F. It has a brinell hardness of 241, an ultimate tensile strength of 98,000 psi and an elongation of 5 per cent in 2 in.

Fig. 7 shows the microstructure of a casting which was tempered 3 hours at 1290° F. It has a brinell hardness of 229. It has an ultimate tensile strength of 97,000 psi and an elongation of 6½ per cent.

Fig. 8 shows the microstructure of a casting which was tempered 3½ hours at 1290° F. It has a brinell hardness of 217, an ultimate tensile strength of 92,500 psi and an elongation of 7 per cent.

Pearlitic malleable castings with a brinell hardness range of 197-241 have mechanical properties which are comparable to forgings in the SAE 1035 to 1050 range and are recommended for highly stressed parts.

Consideration of service requirements is most important in the application of pearlitic malleable castings. The lower ranges of hardness have lower tensile strength and higher elongation whereas higher ranges of hardness have higher tensile strengths and lower elongations.

Pearlitic malleable with a spheroidal structure machines very easily at speeds slightly less than those used for machining malleable. Those of a low brinell hardness machine most easily.

Pearlitic malleable castings have excellent wear resistance and corrosion resistance properties. The damping characteristic—the ability to resist motion and absorb energy within itself—makes pearlitic malleable most suitable where vibration and quiet operation are factors.

A structure of finely laminated and still more finely spheroidized carbides, as shown in Fig. 6 is most satisfactory for all types of induction hardening. Because they are finely spheroidized and uniformly dispersed, the carbides will dissolve rapidly to saturate the austenite with carbon, thus producing a martensite of maximum hardness.

Progressive induction hardening tests show a Rockwell C hardness of 58-60. Single induction hardening tests showed a Rockwell C hardness of 62-65. An oil quench from 1550° F produces a fully martensitic structure with a Rockwell C hardness of 65.

Production of pearlitic malleable castings by these modern methods and improved techniques with complete metallurgical controls assures a product of uniform quality and hardness, without a decarburized rim and with a finely spheroidized structure that is ideally suited for selective hardening and machining.

Pearlitic malleable with these properties is recommended where costs, high strength, wear resistance, corrosion resistance, damping qualities, machinability and hardenability are factors.

Editor's Note: This article is based on two papers presented by Messrs. Steinhoff and Jenkins at the 1953 Market Development Conference of the Malleable Founders' Society.

CASTINGS...

A Material for Ammunition

Foundry techniques have been successfully adapted to the production of a variety of steel and malleable iron shells. Requirements are special but castings offer important advantages over other fabricating methods

By FRANK E. SHUMANN
Chairman
Lehigh Foundries Inc., Easton, Pa.

USE of ferrous castings for ammunition components during World War II was limited as to the number of different end items, but did result in sizable tonnage. Almost without exception, castings were an alternative material—permitted because of forgings shortage or because of equipment deficiencies such as large-diameter automatic bar machines.

An outstanding example of volume production of shells from castings was the small 60 mm, M49A2, shell shown at the right in Fig. 2. A total of 30,000,000 were produced from steel castings. These shells have been fired and no deficiencies have been recorded. The cost of the cast shells was competitive. This production required less than average plant investment, and volume production was initiated with below average starting time delay.

Why Alternative Material?—In times of national emergency, steel production always is a problem. Then the deciding factor between methods of fabrication logically is "how much steel is required to make the end item?"

Fig. 1 shows the typical flow of metal for the manufacture of the cast 60-mm mortar shell. Note that the new metal required, 250 lb for 1670 finished 60-mm shells, as shown on this chart, is at such a low point that its allocation is simple. Also the type of foundry facility needed for this product likewise is easily "earmarked" because, since passenger car production would be curtailed, the demand for high production facilities for small castings would not be critical at the time.

What has happened since World War II? Those few foundries making ammunition components promptly lost interest. Ordnance engineers reverted to "standard" methods and had little time or money to work with alternates. The few semiproduction

Cast Shell Production in the Defense Program

Item	Material	Quantity	Tons
60 mm	Steel	8,000,000	10,000
81 mm	Steel	2,000,000	6,000
4.2 Nose adapter	Malleable	7,000,000	7,000
280 mm	Steel		3,400
155 mm Illuminating shell nose adapter	Malleable	200,000	1,300
Lifting plugs	Malleable	6,000,000	5,000
M20 Booster body	Malleable	10,000,000	5,000

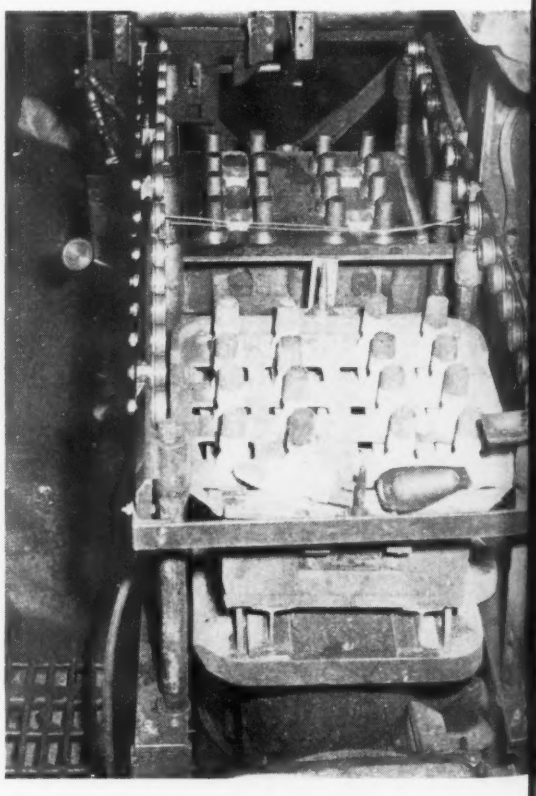


Fig. 3—Resin-sand cores are used in production of 60-mm shells at Lehigh Foundries. This shows core prints on pattern and cores in core fixture

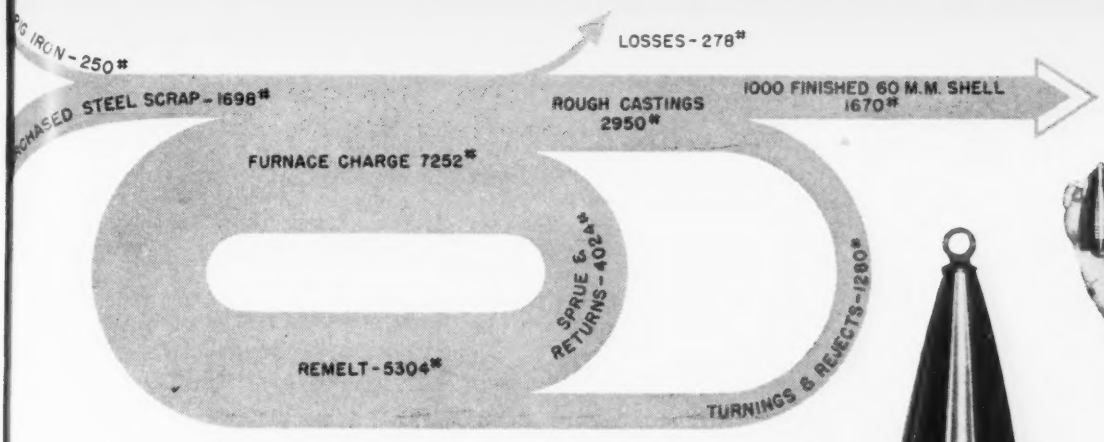

PIG IRON - 250#
LOSSES - 278#
PURCHASED STEEL SCRAP - 1698#
ROUGH CASTINGS 2950#
1000 FINISHED 60 M.M. SHELL 1670#
FURNACE CHARGE 7252#
SPRUE & RETURNS - 402#
REMELT - 5304#
TURNINGS & REJECTS - 1280#

Fig. 1 (above)—Typical metal chart for production of 60-mm shells. Remelt is preferred for the furnace charge because the analysis is known and the metal is available immediately without transportation

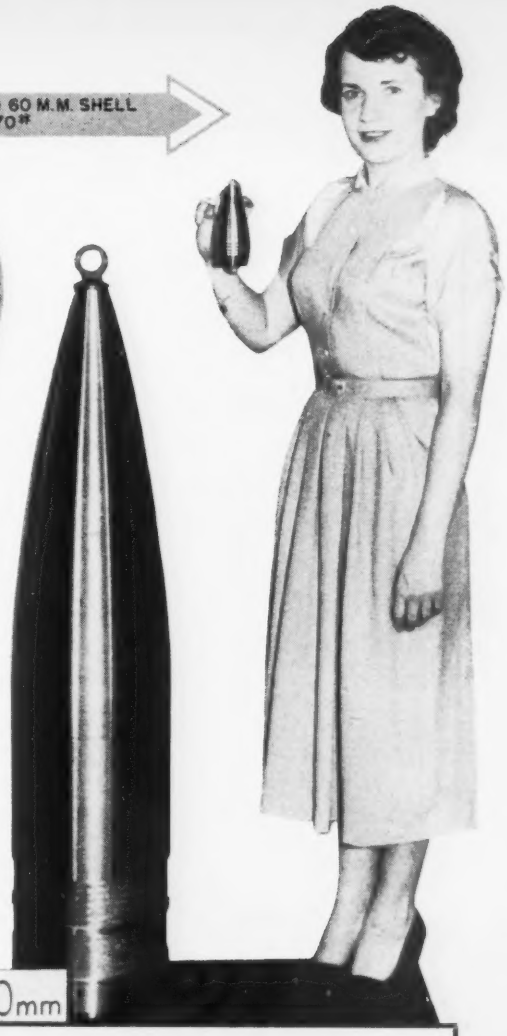


Fig. 2 (right)—Showing the range in size of cast steel shells. The small one is a 60-mm mortar shell. The large one measures 280 mm

contracts placed on a competitive basis all went to other methods than casting. The only postwar recognition of castings during this period was representation of the castings industry on the American Ordnance Association Shell Committee, an industrial group that consults with Ordnance.

So, the castings industry entered the defense period with only slightly greater acceptance of cast

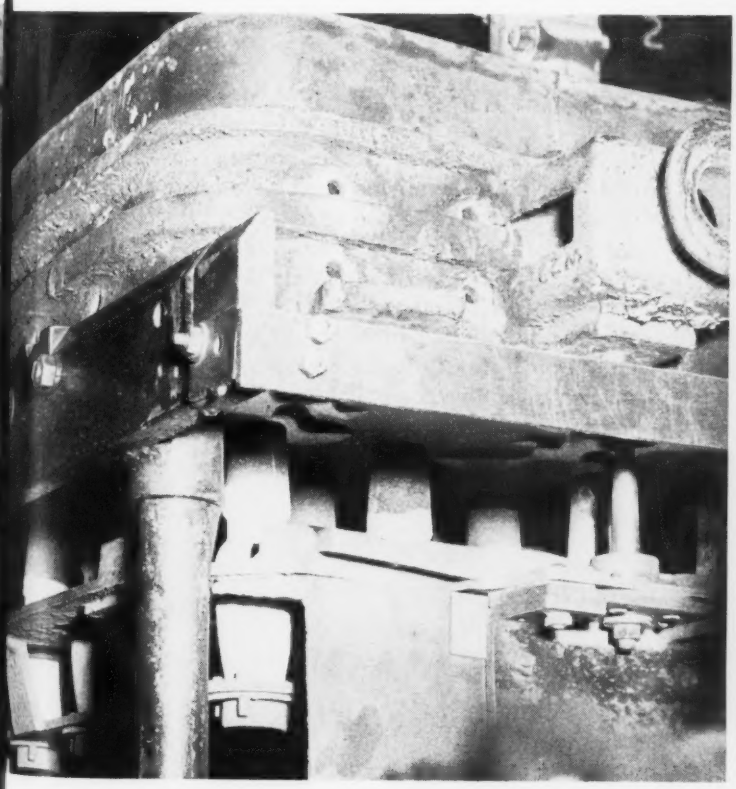


Fig. 4—Here the cores in the fixture are ready to be inserted in the drag of the mold. This is accomplished by lowering the drag over the cores, then inverting it

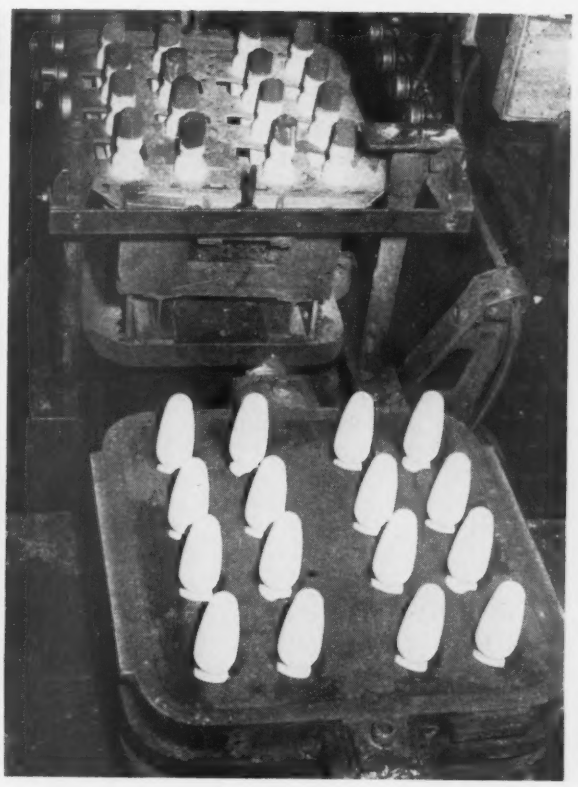


Fig. 5—Background shows cores placed in fixture. Drag in foreground has had cores inserted. Resin-sand cores have smooth surface, are light weight

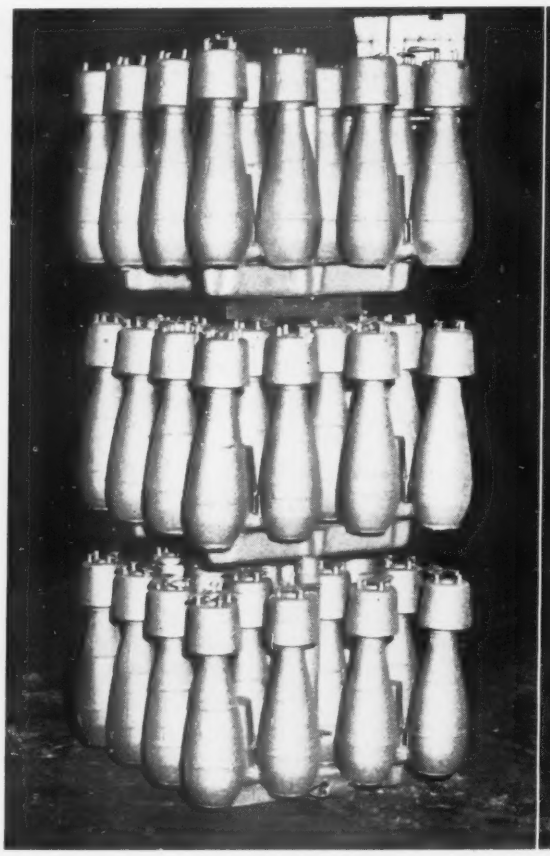


Fig. 6—Cluster of 81-mm shell castings produced in stack molds by the Auto Specialties Mfg. Co.

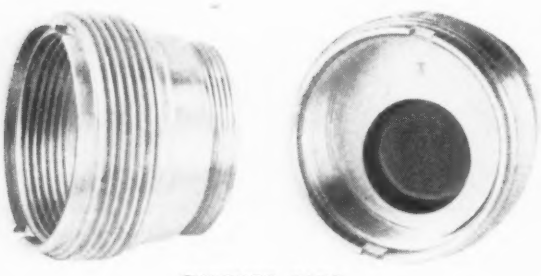
Fig. 7—Double stack of molds for 81-mm shell castings clamped on conveyor car and ready for pouring

shells than existed in 1940. However, when the material squeeze developed, foundries again produced shells. To give some idea of the scope of this activity, the accompanying table of present defense production of some end products is given: (The figures are necessarily approximate.)

Large volume and special requirements are certain to develop out of the ordinary foundry techniques such as are shown in some of the accompanying illustrations.

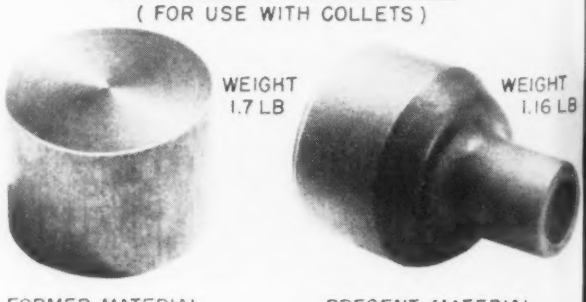
Figs. 3, 4 and 5 show resin-sand cores used for 60-mm shells at Lehigh Foundries Inc., Easton, Pa. The casting process provided a smoother interior cavity for loading. Reduced weight of the core and the accuracy of fit attainable between core print and core develops excellent concentricity and lower machining costs. Note the core setting device to which the drag is lowered, and drag and cores inverted.

Figs. 6, 7 and 8 show the 81-mm shell made at Auto Specialties Mfg. Co., St. Joseph, Mich., and the method of production. This method provides a unique adaptation of special dry sand molding facilities used to accomplish volume production of one of the most critically needed ammunition items.



FINISHED PART

SCREW MACHINE APPLICATION
(FOR USE WITH COLLETS)



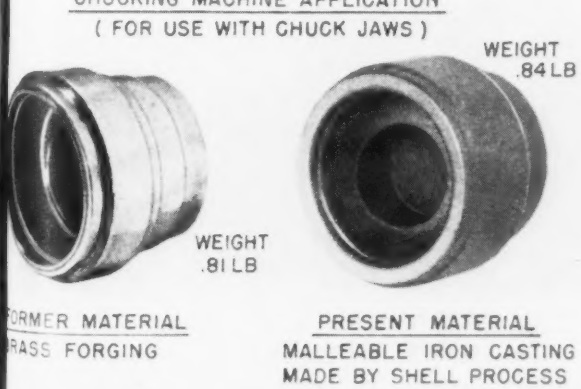
FORMER MATERIAL
BRASS BAR STOCK

PRESENT MATERIAL
MALLEABLE IRON CASTING
MADE BY SHELL PROCESS

Fig. 8—Stack molds for 81-mm cast steel shells on the pouring conveyor. This method adapts special dry sand molding facilities to accomplish volume production of one of the most critically needed items of ammunition

Fig. 9 shows a 4.2 nose adapter made by Albion Malleable Iron Co., Albion, Mich., Central Foundry Division of General Motors Corp., Saginaw, Mich., Columbia Malleable Castings Corp., Columbia, Pa., Dalton Foundries Inc., Warsaw, Ind., Lehigh Foundries Inc., Easton, Pa., and Texas Foundries Inc., Lufkin, Tex. Castings quickly filled the breach created by the nonexistence of screw machine capacity when the design of this part was changed, so that the bar size required to make it as a screw

Fig. 10—Booster body for artillery shell fuze



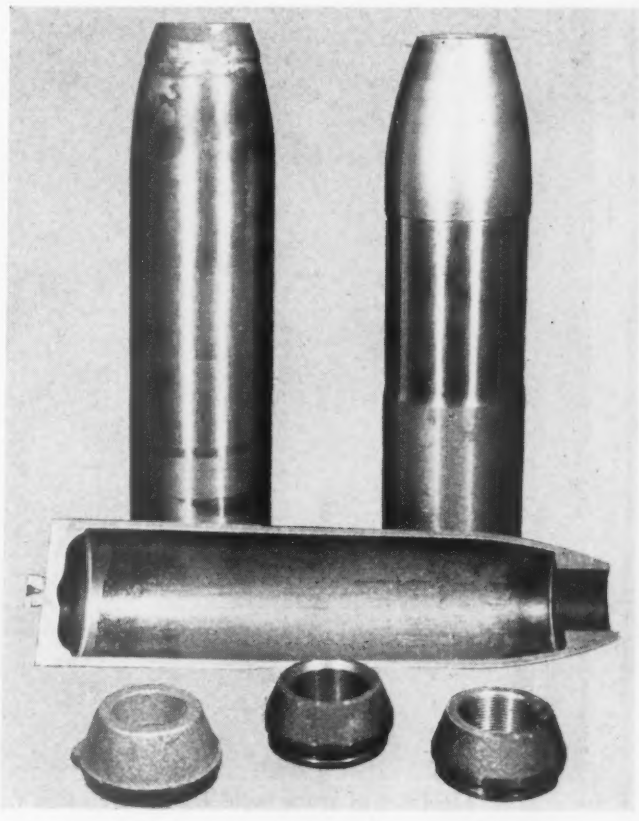


Fig. 9—Shell nose adapters (foreground), left to right, in rough state, semifinished and finished

machine part was increased from 2⅝ in. to 3½ in. Note how the casting is brazed into the shell in a semifinished condition and the final OD turn on the shell is the only OD turn on the nose. There is a cost advantage in favor of castings.

Fig. 10 shows a M21A4 booster body. Central Foundry Division of General Motors stepped into the breach created by the necessity to convert this part from brass to steel or some other form of ferrous material. Central Foundry Division developed several designs of malleable iron castings made by the shell molding process that can be finished either on chucking machines or by using collets in converted bar machines. If made from steel bar stock, this part would require more than twice as much metal to produce each booster body.

Figs. 11, 12, 13 and 14 illustrate a 280-mm shell. At Auto Specialties this giant is made as a steel casting. Imagine the cost in time and money of setting up equivalent forging facilities. The interior cavity is cast so close to dimension that the firing accuracy of the shell has been outstanding. By the same token many hours of outside finishing and nose forming have been saved.

Castings can become much more important components for ammunition but at present there are serious obstacles. Each end item, because of special requirements, becomes a tedious research problem. A number of such research projects are under way in several foundries at this time.

Fragmentation requirements are a basic consideration of most H.E. shell bodies. Picatinny Arsenal has

Fig. 11—Type of stack mold used for casting the 280-mm steel shell at Auto Specialties Mfg. Co.

Fig. 12—This shows the 280-mm shell in the as-cast condition before sprue and risers removed

been working continuously for two years developing a relationship between wall thickness, type of explosive loading, and various types of cast materials. The results of this study will be known later this summer and one of the most serious objections to castings may be overcome.

Much progress has been made in inspection techniques which prove each individual shell casting acceptable for field use. One hundred per cent porosity and hydrostatic tests, and the use of x-ray in the 280 mm, fill these needs. There is, however, a need for much more work in the specification and inspection control field.

Probably the most serious obstacle is objective interest on the part of foundries themselves. You may not make shells out of castings—you have to make castings capable of being made into shell. This is not a "commercial" product. Shell must have certain flight characteristics at high velocities, and must fit into existing range tables. This, in turn, means rigid control of dimensions, weight and distribution of weight. Then the physical properties must be such that they withstand firing pressures safely, and also develop satisfactory fragmentation at the target. Above all, they must have no flaw permitting the charge to go off prematurely.

To be successful in making ammunition castings, foundrymen have to adjust their thinking to these special requirements.

However, having done so, they are probably better equipped than ever to face the new demands that the post-defense civilian market is certain to require.

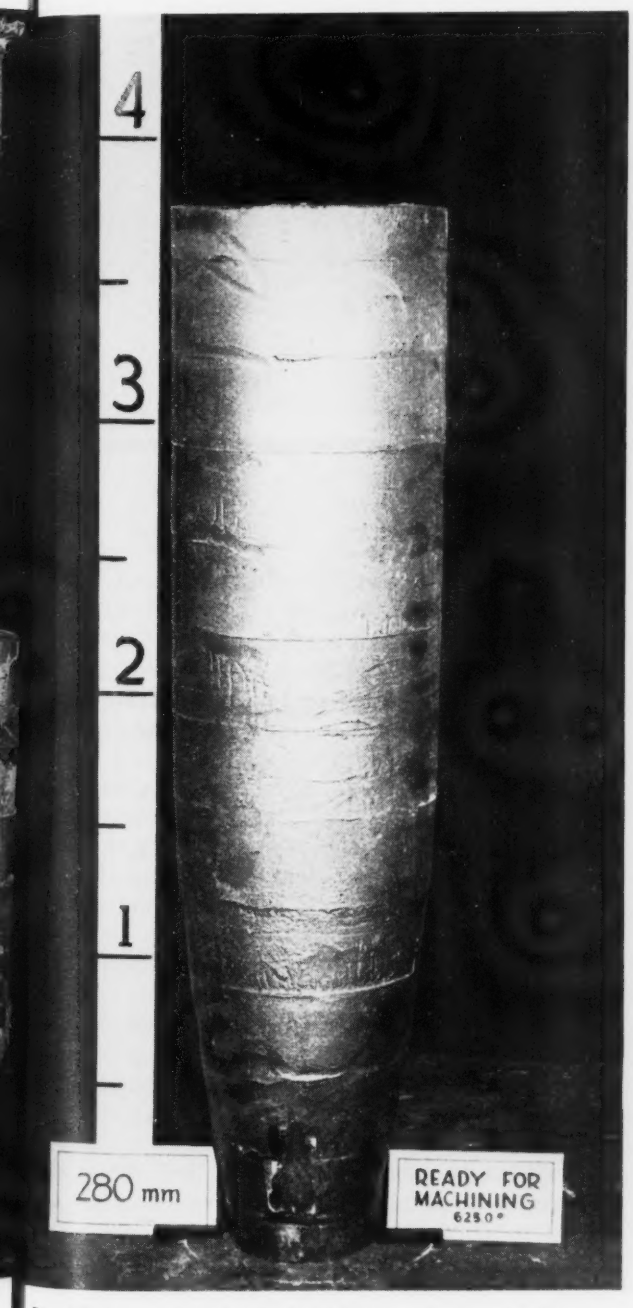


Fig. 13—Here the cleaned shell is ready for machining. The casting process cuts finishing operations

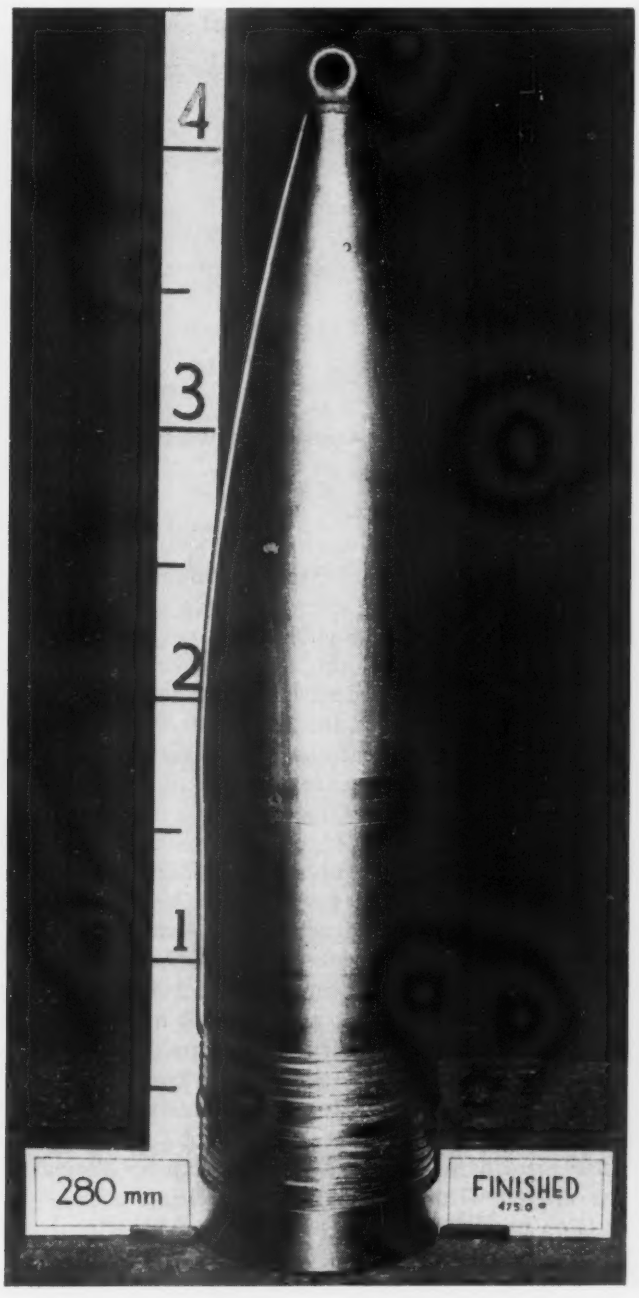


Fig. 14—The finished shell. Interior cavity is so close to dimension, firing accuracy is outstanding

TIN and LEADED-TIN

This discussion of the properties of various tin and leaded-tin bronze alloys, together with foundry practice in the production of castings, comprises one chapter from the author's new book, Cast Bronze. *It is reproduced here through the permission of the publishers, the American Society for Metals*

By HAROLD J. ROAST
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Hampstead, Que., Canada

THIS discussion will consider the six tin and leaded-tin bronzes shown in the accompanying table. It is difficult to make a choice of a single figure for any of the mechanical properties given, but the writer has taken into consideration American Society for Metals' *Metal Handbook,* the American Society for Testing Materials' specifications and other publications, the Brass and Bronze Ingot Institute and his own experience in the figures quoted.

As we get a better knowledge of degassing, deoxidizing and the processes involved in shrinkage, I am sure that we shall find that we can make better metal as a matter of every-day practice. The result will be an improvement in such figures as have been used.

The very latitude existing in the specifications today is the best evidence that we have not arrived at perfection. Factors in foundry procedures are:

Metal—It is assumed that this will be composition ingot made by a reputable ingot manufacturer.

Melting—Where pressure tightness is not a consideration nor maximum density a requisite, these alloys may be melted without flux in an oxidizing atmosphere. (For use as bearings, porosity is a beneficent factor as it helps in retaining an oil film.) Efficient stirring is essential, as the lead will segregate rapidly when molten metal containing it is left in a quiescent state.

In cases where pressure tightness and maximum density are desired, the following procedure should be followed, based on Walpole's flux method.

1. Prepare the flux by mixing equal parts by weight of dry copper mill scale (this is the cheapest form of CuO), dry clean silica sand, and powdered fused borax. Keep in suitable container to avoid absorption of moisture.

2. Use enough flux to maintain a cover ¼-in. thick over the molten metal under the conditions of melting. Generally 3 per cent of the weight of the metal to be treated is sufficient. Where the phosphorus content of the charge exceeds 0.05 per cent a larger amount of flux may be required.

3. Put the flux in with the metal as it is charged to the melting unit.

4. Melt as rapidly as possible under an oxidizing atmosphere.

5. When the metal has reached the desired temperature, stir the flux well into it, to further the oxidizing process.

6. Transfer to pouring container and throw dry silica sand onto the metal to thicken the flux and facilitate its removal by skimming.

7. Skim and add 4 oz of 15 per cent phosphor-copper per 100 lb of metal for purpose of deoxidation.

8. Stir well, exposing as little of the metal to the air as is practicable, and leave for at least 2 minutes before pouring.

BRONZES

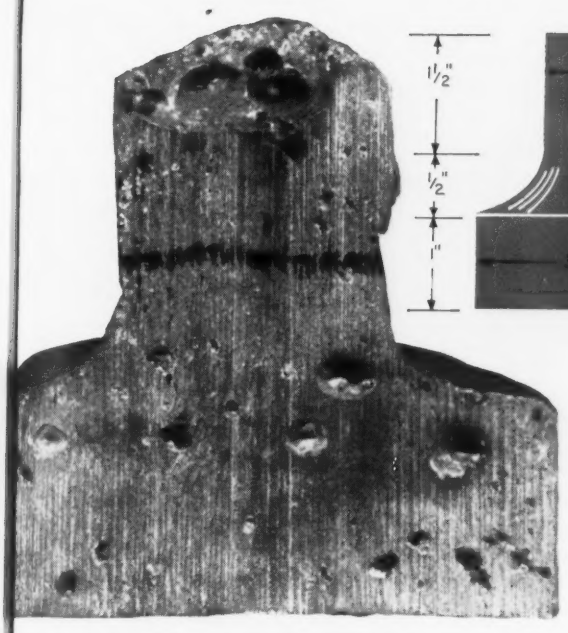


Fig. 3—Test casting poured with copper degasified with calcium boride. Casting is sound, having no porosity but only normal shrinkage areas

Fig. 2 (left above)—Test block for pure copper castings is disk joined to cylinder

Fig. 1 (left)—This test casting, poured with gassy copper, made from pattern shown in Fig. 2

Characteristics of Six Tin and Leaded-Tin Bronzes

	No. 1	No. 2	No. 3	No. 4	No. 5	No. 6
Composition						
Copper	88	80	75	85	70	60
Tin	8	10	7	5	6	..
Lead	0	10	15	5	21	40
Zinc	4	0	3	5	3	..
Mechanical Properties						
Yield strength	18,000	17,000	16,000	17,000	12,000	....
Tensile strength	40,000	32,000	26,000	34,000	20,000	6000
Elongation, % in 2 in.	20	12	15	25	12	15
Brinell hardness	68	65	55	60	50	28
Izod, ft-lb	9	5	7	9	6	..
Deformation limit	14,000	14,500	13,000	11,000	12,000	..
Physicals						
Electrical conductivity, % of annealed copper	10	10	12	15	10	..
Pouring temperature	1900	1900	1900	1900	1900	..
Density, lb. per cu in.	0.318	0.320	0.334	0.318	0.345	..
per cu. ft.	560	563	588	560	603	..

A residual phosphorus content of 0.05 to 0.03 per cent is desirable.

Molds—Tin bronzes may be cast in either green or dry sand molds. Unless the casting is unusually large or complicated in design, green sand containing not more than 6 per cent moisture is all that is needed. Use Albany 00 sand for small work and equal parts of Albany 00 and Albany 1½ for castings up to 400 lb; larger than this use Albany 1½ alone. Synthetic silica sand may also be used.

Pouring—The usual precautions should be taken—namely, pour as close to sprue head as possible, keep sprue head full all the time, pour as slowly as will avoid "cold shuts," regulate the feed of the metal by some suitable construction between the sprue, riser and entry to casting. As to pouring temperature, the nearer 1900°F the better, but the pouring temperature is a function of the casting as well as the alloy and the optimum pouring temperature for any given casting is a matter of trial and error.

Removal From Sand—These castings may be shaken out as soon as they cease to be visibly red in a dark room—that is, under 1000°F—but they may equally well be left to cool in the mold overnight.

Gating and Risering—These alloys do not have high shrinkage; risers of very moderate feeding capacity can be used. In making a casting of a new design it is often best to cast it without any risers and then break it up and see what evidence there is of need for risers as judged by signs of internal or external shrinkage.

Machining—The leaded bronzes machine easily and at high speed; the lead-free bronzes machine less readily although quite satisfactorily.

Heat Treatment—These alloys are not normally heat treated. However, the casting process undoubtedly leaves many residual stresses in the finished product and it is the writer's opinion that, as time goes on, annealing, say at between 500 to 1000° F to release inherent stresses, will be called for by construction engineers—not especially for tin bronzes but for all castings.

Furnaces—Any of the ordinary furnaces may be

used for tin or leaded-tin bronze, but the electric furnace, especially the high-frequency type, is recommended.

Effect of Small Amounts of Phosphorus, Aluminum and Silicon on Leaded Bronze—In making some experiments along this line, the alloy used was No. 3—that is, tin 7 per cent, lead 15 per cent, zinc 3 per cent and copper 75 per cent. The casting was a semicylindrical bearing weighing 300 lb. The metal used was virgin copper, tin, lead and zinc. A new plumbago crucible was heated in a pit furnace fired with city gas, and 350 lb of the bronze melted therein. One casting was poured at 2100 and another at 1900°F. The exterior appearance of both was satisfactory and the fracture quite characteristic—namely, leady colored, with minute light colored areas (assumed to be gas porosity), and a well-defined chill to a depth of about ¼-in.

These castings were remelted, heated to 2200°F and 0.05 per cent phosphorus added in the form of 15 per cent phosphor copper. One casting was then poured at 2100 and another at 1900° F. In general, the castings were similar to those without the phosphorus, except that the phosphorus ones cut into the sand a little more.

Addition of Aluminum Is Undesirable

Two other castings were made from another 350-lb heat and 0.05 per cent of aluminum was added. One was cast at 2100 and the other at 1900°F. The fracture was very unsatisfactory, showing in color from dull red to dull brown. Large areas of dendrites held loosely together were evident to the naked eye, being about ⅛-in. long. There also was a pale golden colored area having a smooth surface. The other casting poured at 1900°F also had a fracture that was very undesirable, with heavy shrinkage separation of the discolored crystals. Another melt having 0.10 per cent aluminum gave equally bad fractures and in addition a silvery color on the surface.

Another heat of virgin metal was brought to 2200° F and 0.05 per cent silicon added in the form of 10 per cent silicon-copper. The first casting was poured at 2100 and the other at 1900°F. The first casting showed a dead white surface on the length of the gate all around, and the surface of the casting itself was smooth. The fracture was not satisfactory, showing definite evidence of intercrystalline shrinkage and some discoloration. The casting poured at 1900°F showed the characteristic white color and, in addition, a wormlike appearance. The fracture was somewhat discolored but not as bad as the other casting.

When the castings were poured that had the silicon addition a swirling wisp of smoke came up the sprue, and a white deposit formed around the sprue head. This was quite noticeable in all castings to which silicon had been added. Some of this powder was collected for analysis and was found to consist of 18.65 per cent silica, 8.69 per cent lead, 1.42 per cent iron and aluminum, 60.30 per cent zinc, and 10.94 per cent copper, by difference.

All the castings were made in green sand, equal parts of Albany 00 and 1½, with 6 per cent moisture.

To sum up: The addition of 0.05 per cent phosphorus to metal gave no evidence of trouble either as to surface appearance or fracture, when cast at high or low temperatures, although the lower temperature did have a closer grain, as would be expected. The addition of 0.05 per cent aluminum gave no evidence of its presence on the surface of the casting but showed clearly in the fracture, giving seriously enlarged dendritic structure when cast at the high temperature, and still more internal shrinkage when cast at the low temperature. The addition of 0.05 per cent silicon gave serious defects when cast at both high and low temperatures.

It is evident from the foregoing experiments that every care must be taken to keep aluminum and silicon out of leaded-tin bronzes.

No. 1 alloy, generally referred to as "gun metal,"

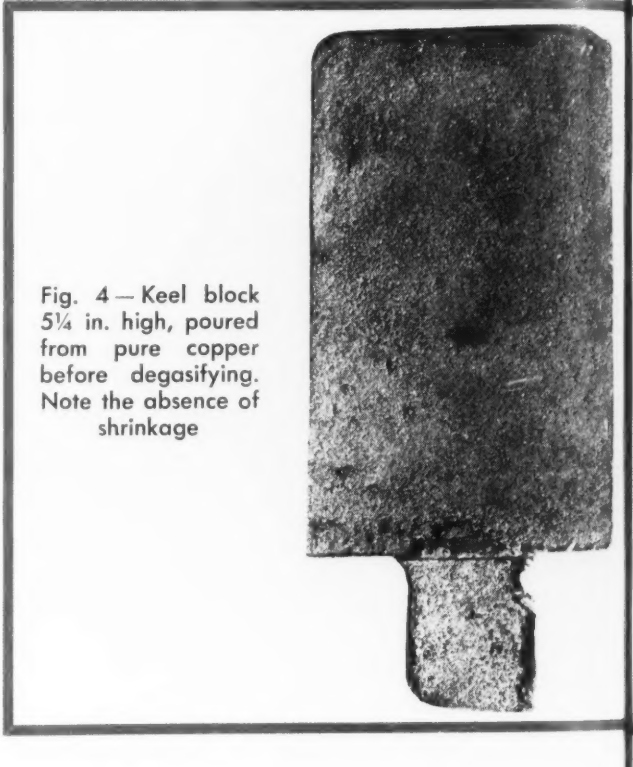


Fig. 4 — Keel block 5¼ in. high, poured from pure copper before degasifying. Note the absence of shrinkage

is to be preferred to prewar gun metal of composition 88 per cent Cu, 10 per cent Sn, 2 per cent Zn. The physical properties of the two are, for all practical purposes, similar, but the castability of No. 1 is superior to that of the old composition.

No. 2 alloy is a good bearing metal but, in the writer's opinion, no better than No. 3.

No. 3 is the alloy used for railway engine bearings. It is easily the best alloy of the five from the point of view of castability; in fact it is the most foolproof alloy that the foundry can handle. It gives good pressure tightness but, in common with all leaded bronzes, should not be used where temperatures exceed 550°F. The alloy has good corrosion resistance to the sulphite liquor in paper mills, and to many other solutions. Like all lead-containing alloys it should not be used in contact with food products owing to the danger of lead poisoning.

No. 4, known as "eighty five and three fives" or "ounce metal," has nothing like as high a "castability"

rating as No. 3. It has a very large field of use, such as plumbing supplies, but the main reason for its popularity is its cheapness.

No. 5 is used by practically all the railroads of North America as journal bearings for railway cars. It sacrifices strength for plasticity.

No. 6 (Copper-Lead Bronze)—This is an alloy of 60 per cent copper and 40 per cent lead. As is well known, the lead does not really alloy with the copper, except to a very small extent, and the foundryman's problem is to get a good emulsion of the two metals so that when the alloy solidifies the lead will be distributed generally and not be located in segregated areas. The writer has made large quantities of this alloy for use chiefly in piston packing rings; the method employed included the following five steps:

Fig. 5—A section of same keel block as in Fig. 4, poured after degasifying. Note the shrinkage of sides

1. Have two pit or tilting furnaces holding a crucible of 250 lb capacity each.

2. Put 120 lb of pure ingot copper into one crucible and bring it to 2300°, then add gradually 80 lb of virgin pig lead and bring again to 2300° F; stir well.

3. Take out the empty red-hot crucible from the second furnace and place it on the floor.

4. Take out the full crucible and place it beside the empty one.

5. Put 2 lb of stick sulphur into a brown paper bag, throw the bag into the empty crucible, and immediately pour in the contents of the full crucible, so that the copper, lead and sulphur mix; stir well and pour into molds.

This metal makes good bearings for many purposes.

Ventilation—Any foundry melting leaded bronzes should pay special attention to ventilation both at the furnace area and during the transfer of metal from furnace to molds and during pouring.

High Conductivity Copper—Making castings of high-conductivity copper is a job requiring great care in melting and deoxidizing, but when the matter has become routine there should be no undue difficulty in getting 85 per cent conductivity, taking standard wrought electrolytic copper as 100 per cent. The procedure is as follows:

Furnace—Graphite crucible furnace, oil fired, or other suitable melting unit such as high-frequency lift coil type or stationary unit. An open-flame oil-fired furnace can be used, but it is not as easy to control the operation.

Metal—Pure virgin copper ingot.

Flux—None; use charcoal to cover molten copper but be sure that charcoal is dry and free from dust, and that it is put on the top of the charge of copper ingots so that it heats up with the metal. Never put charcoal at the bottom of a crucible or ladle and pour molten metal on it.

Cover—Use an old crucible bottom for a crucible cover if melting in an oil fired crucible pit furnace.

Deoxidizer—Calcium boride, in powder form, in suitable container as described later.

Ladle to Dip Out Sample Lots During Melting—A small graphite crucible with a suitable iron holder and handles bent at 45 degrees.

Test Pieces—These are made from a wooden pattern as sketched in Fig. 2; that is, a disk 3 in. in diam and 1 in. thick, joined to a smaller cylinder 1½ in. diam and 1½ in. high by a generous fillet ½ in. high, giving a total height of 3 in.

Procedures—250 lb of ingot is placed in the crucible, taking care that at no time does any of the copper protrude above the crucible top so that the furnace gases can play upon it. (As noted previously the crucible should be covered.) If all the ingot will not go into the crucible at the first charging, cover the copper that has been put in with lump charcoal, free from dust and dry, replace the lid, wait till all is melted and then charge the remainder. Heat as rapidly as possible to 2300°F.

Submerge the small graphite crucible in the molten copper and hold until it has acquired the temperature of the molten copper. Then take out the crucible, at least half-full of molten copper, and pour the metal into one of the previously made dry sand molds made from the pattern of Fig. 2. (The writer made the mistake of making some test blocks out of electrode carbon but found that all tests came out as "good," while the controls in dry sand swelled up badly.) Stop the pouring 1 in. from the top of the mold, or just above the fillet. The metal will spit violently due to the release of gas absorbed by the molten metal and released as the metal cools. The metal will probably rise in the mold right to the top, and solidify with many blow holes. The following measures are then taken to degasify the melt:

Two lots of calcium boride, consisting of 5 oz each of black calcium boride powder, are put into two short pieces of thin-walled copper tubing about 2 in. diam and swaged shut at both ends. These are forced into the claws of a steel rod split at the end, and submerged into the melt, one after the other. The reaction between the calcium boride and the copper is violent, and room should (*Please turn to page* 229)

TECHNICAL REPORTS

From the AFS Convention

Concluding reports on technical sessions of the recent Chicago convention of the American Foundrymen's Society are presented here. Subjects covered include Sand Reclamation, Heat Transfer, Education, Safety and Hygiene, Timestudy and Methods, Refractories, Foundry Costs, Gray Iron, Steel and Shop Courses. See the June issue for reports on other subjects

CONSIDERABLE interest was shown at the recent American Foundrymen's Society convention in the two well attended symposium sessions devoted to the subject of sand reclamation. Sponsored by the Gray Iron, Sand and Steel Divisions, one of these sessions was devoted to dry scrubbing for reclaiming sand, the other was concerned with wet reclamation methods.

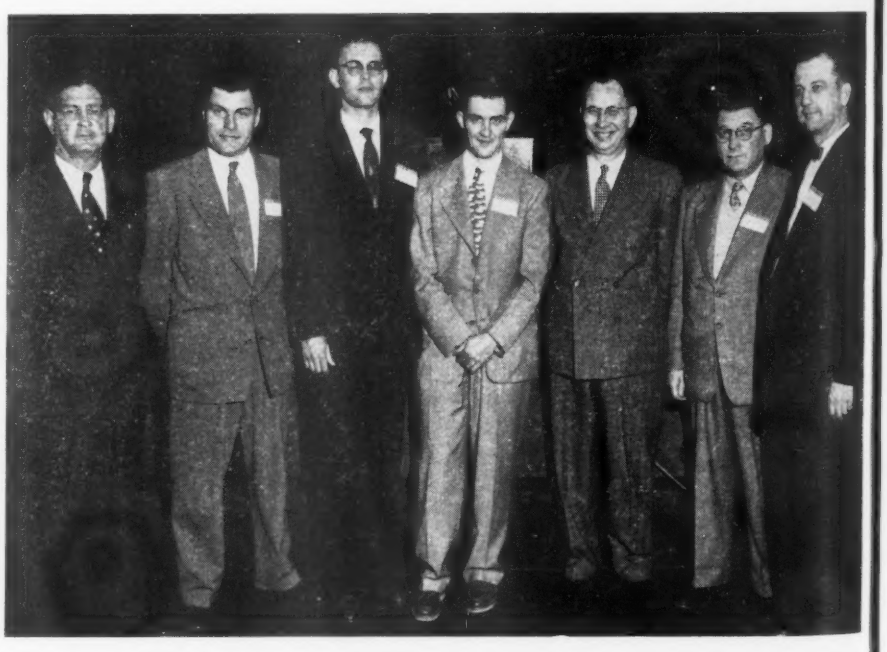
The opening session, presided over by J. A. Rassenfoss, American Steel Foundries, East Chicago, Ind., and R. H. Jacoby, the Key Co., E. St. Louis, Ill., was opened with a discussion of **Development of Foundry Sand Reclamation** by C. E. Wenninger, National Engineering Co., Chicago.

Mr. Wenninger pointed out that true reconditioning of sand requires treatment of individual sand grains. Dry mulling and aeration of sand is not completely effective in restoring sand to its original properties. Heat is effective with core sand in removing binders but is not completely successful with molding sand because it does not break down all of the clay shell surrounding the grains, he said. Wet methods are successful but the sand must be scrubbed to remove the clay.

Dry scrubbing systems have been developed within only the last few years. Objectives of such a system are to break up compound sand formations, remove the shell of binder surrounding the grains and restore the sand close to its original dimensions. In addition, the sand must be subjected to means of classification to remove the debris created and return the sand to approximately its original grain distribution.

Reclamation of Sand by Pneumatic Dry Scrubbing, by H. W. Meyer, General Steel Castings Corp., Granite City, Ill., was a discussion of that company's use of dry sand reclamation equipment. Its installation reclaims sand for use as facing material. The equipment reduces the AFS clay content of used sand entering the scrubber from about 5 per cent to 2½ to 3 per cent, and provides a sand with thermal shock properties comparable to those of new sand. Operating two scrubbers, each capable of reclaiming 6 tons per hour, the cost of labor and material for the operation is about 44 cents a ton.

Dry Reclamation of Molding Sand for Steel Castings, a description of eight-months' operation of a dry reclamation system at Duncan Foundry & Machine Works Inc., Alton, Ill., was presented by J. A. Cannon of that company. He said the system has re-



Chairmen and speakers at symposium on sand reclamation at the Chicago AFS Convention. Left to right: T. W. Curry, Lynchburg Foundry Co., Lynchburg, Va.; G. H. Curtis, Nichols Engineering & Research Corp., New York; R. H. Shurmer, Hydro-Blast Corp., Chicago; G. M. Etherington, American Brake Shoe Co., Mahwah, N. J.; H. H. Johnson, National Malleable & Steel Castings Co., Sharon, Pa.; P. C. Will, Hydro-Blast Corp., Chicago, and R. W. Bennett, Walter Gerlinger Inc., Milwaukee

Good attendance marked technical meetings at the convention. A sand session audience is shown here

sulted in a 75 per cent reduction in new sand use, while quality of sand has been maintained. This company produces steel castings weighing 1 to 3000 lb and averaging about 50 lb. Only new sand added to the system is from cores at shakeout, and this addition practically balances the 18 per cent loss sustained in the reclamation system.

The company has experienced a substantial reduction in casting defects since operation of the dry scrubbing unit, although it does not attribute all of this improvement to the sand. During the eight months, consumption of welding rods for casting repairs declined 30 per cent, and defects in castings attributable to sand blows and scabs was cut more than 80 per cent. Operating cost of the sand reclamation averages $1.43 per ton of sand and $1.37 per ton of castings.

In subsequent discussion it was stated that cost of the dry sand scrubbing equipment varies from $25,000 to $100,000, while cost of auxiliary equipment used with the system adds an additional $10,000 to $25,000. Maximum theoretical output of the unit is 6 tons per hour.

T. W. Curry, Lynchburg Foundry Co., Lynchburg, Va., and G. M. Etherington, American Brake Shoe Co., Mahwah, N. J., presided over the second symposium on sand reclamation.

A Wet Method of Sand Reclamation, by R. H. Shurmer and P. C. Will, Hydro-Blast Corp., Chicago, was presented by Mr. Shurmer. The paper covered results of laboratory reclamation of sand in a 2-ton-per-hour pilot system. Five to fifty-ton batches of sand from various foundries were processed. Comparison of system sand reclaimed by the wet method with new sand showed that it produced castings with equal finish, equal baked strength, lower green strength, higher permeability and a comparable sintering point. It permitted better control of grain distribution, lower costs per ton, and the minor fact that its color differs from that of new sand.

Sand Reclamation in a Steel Foundry, by H. H. Johnson, R. Y. McCleery and G. A. Fisher, National Malleable & Steel Castings Co., Sharon, Pa., was presented by Mr. Johnson. In discussing use of a wet method of reclaiming sand at National, the speaker emphasized that such a unit is not self-operating; it requires supervision and control. For proper operation sand must (*Please turn to page* 128)

Effects of VIBRATION

During Solidification of Castings

Vibration imposed on solidifying alloys has these effects: Refinement of as-cast grain sizes; reduction in depth of columnar grain growth, and accentuation of the divorcement of intermetallic compounds from the eutectic mixtures which form during the process of solidification

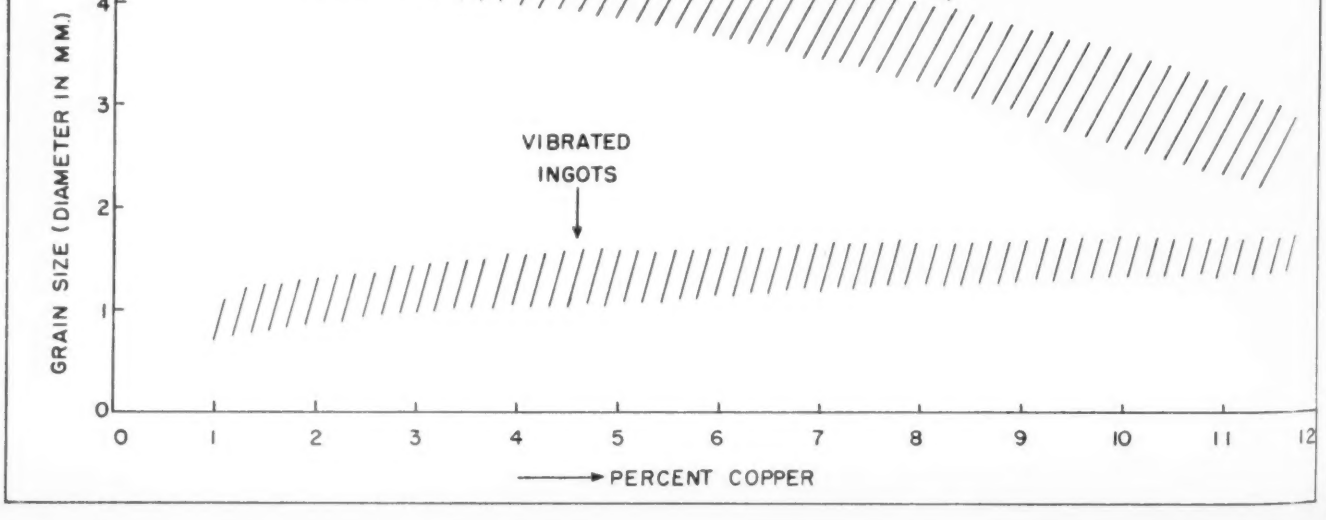
THE use of sonic and ultrasonic vibrations has been proposed as useful in a large variety of metallurgical processes. The particular application of vibration to molten metals was probably first attempted by Boyle and Taylor[1], who found that ultrasonic vibrations could effectively degas light metals. Patents along similar lines were issued to Kruger and Kossman[2] and to Hertl[3] in 1934.

Jahn and Reisinger[4] patented a process for treating molten metal with high frequency mechanical vibration of 100,000 to 200,000 cps produced by a piezo-electric source at a low energy level and coupled into the melt by means of a vibration metal probe or through an oil bath. It was claimed that gas inclusions, dross and slag were expelled by the process, producing a uniformly fine-grained casting, and increasing the toughness, ultimate tensile strength and yield strength of the metal.

In the same year (1935), Sokoloff[5] studied the effect of supersonic vibrations on the solidification of zinc. Frequencies in the range 600-4500 Kcs/sec were used. Sokoloff reported that the vibrated melts had a different grain structure than those solidified without vibration. The grain structure showed a pronounced dendritic formation giving the appearance of a coarser grain size although close examination revealed that the actual grain size was finer.

Schmid and Ehret[6] used a magnetostriction vibrator fixed to the crucible holding the melt. They found that in general the vibrated melts solidified to a finer grain size than those untreated but that the grain size was often refined nonuniformly throughout the ingot cross section. Antimony, cadmium, duralumin and silumin were used in these experiments. Antimony and cadmium exhibited marked grain refinement when vibrated. Duralumin behaved peculiarly in that grain boundaries could not be revealed by etching owing to the fact that the dispersed phase was no longer present as a grain boundary network. Coring was absent after vibration and the hardness was increased from 78 to 96 vhn (probably by vir-

Fig. 1—Comparative grain size of vibrated and unvibrated ingots in relation to copper content



By W. ROSTOKER and M. J. BERGER
Research Metallurgist *Associate Metallurgist*
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Illinois Institute of Technology
Chicago

tue of reduced porosity). In the case of silumin, the needle-like crystals of silicon in the eutectic were broken up into fine particles by the vibration.

Schmid and Roll[7] attempted to isolate the effects of frequency and intensity of vibration on grain refining. Using frequencies of 50, 9000, and 200,000 cps, respectively, and intensities of 2-39 watt/cm^2, they conducted experiments on several low-melting Wood's metal alloys containing various combinations of bismuth, cadmium, lead, tin and zinc. All of these alloys showed a needle-like structure when solidified without vibration. Specimens solidified under vibration showed a disintegration of the needle structure, the effect becoming more marked as the intensity was increased, but frequency appeared to have no effect.

These investigators developed the theory that grain refinement is caused by frictional effects between the melt and the solidifying crystals. From approximate calculations they produced evidence that fragmentation was possible under imposed experimental conditons of vibration.

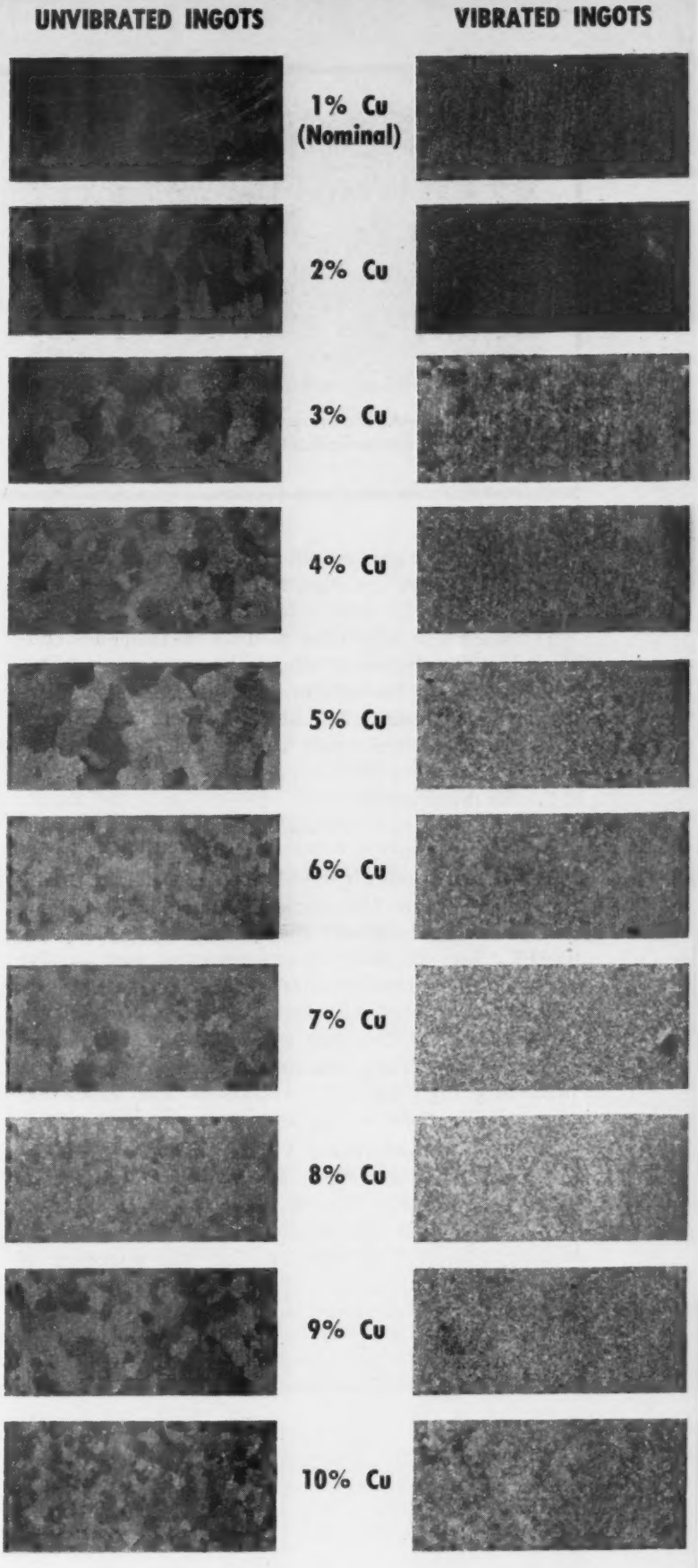
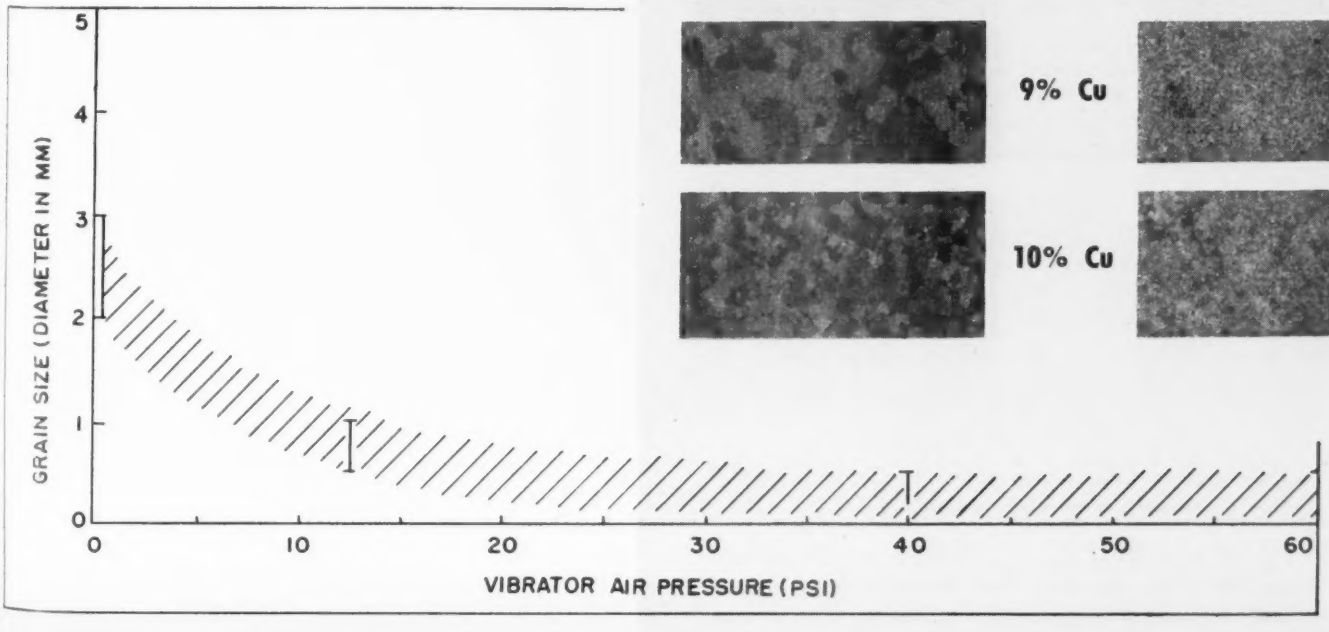


Fig. 2 (right)—Macrostructures of aluminum-copper ingots at 2½ inches from the bottom of the ingots (slow rate of solidification)

Fig. 3 (below)—Showing effect on grain refinement of variations in vibrational energy



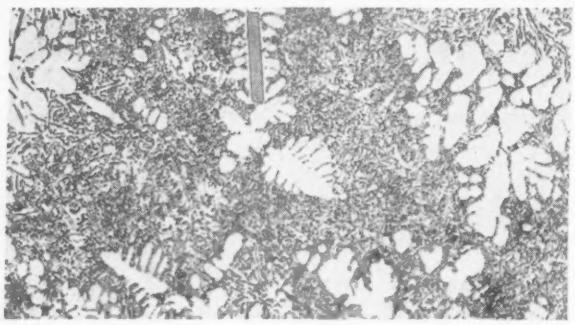


Fig. 4—Al-Si alloy microstructure obtained with slow solidification, no vibration. X150

Fig. 5—Structure of the Al-Si alloy solidified slowly under effect of vibration. X150

Hiedemann[8] endeavored to refine the grain size of steel castings by high-frequency vibrations but was unsuccessful.

Vibration has been used to disperse lead in aluminum[9] and cadmium in silumin[6].

In summary, the effects of vibration on solidifying metals appear to be able:

1. To refine the grain size of some metals and alloys.
2. To degas melts.
3. To disperse immiscible liquids and solids throughout a melt.

There has been a general preoccupation with the use of ultrasonic frequencies although at least one group of investigators[7] found low frequencies to be useful. The majority of experimental work so far published has been qualitative at best. Only one paper[7] attempted to analyze the grain refinement problem beyond the stage of simple recognition of a phenomenon. There has been a general difficulty in producing high intensity vibrations and effectively transmitting them to the melt.

Methods of Generating Vibrations—Vibration frequencies are arbitrarily classed as sonic or supersonic (ultrasonic). The dividing line between these two designations occurs at about 17,000 cycles per second (cps). The division, for the purposes of this work, is artificial and has no significance but the terminology is useful and has common usage.

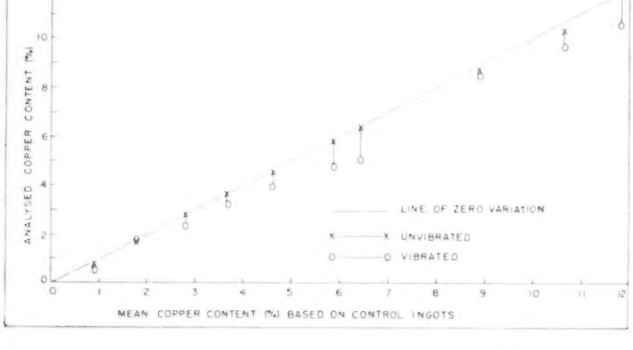


Fig. 8—Degree of segregation was empirically estimated as the deviation from the mean copper content in control ingots, 2½ in. from chilled end

A. Ultrasonic Vibration Generators

1. *Magnetostriction Generators* — Ferromagnetic metals undergo elastic expansion and contraction under the influence of an alternating magnetic field. The ferromagnetic material is used in rod form as the core of a solenoid. The dimensions of the rod are chosen such that its natural resonant frequency is approximately equal to the frequency of the alternating current energizing the solenoid. Under these conditions the amplitude of magnetostrictive vibrations is maximized. In turn the maximum amplitude is proportional to the length of the rod and the magnetizing force of the alternating magnetic field. Generally this basic principle permits the generation of frequencies up to 100,000 cps. Heat dissipation problems effectively imposed an upper limit. Amplitudes of vibration are generally small.

2. *Piezo-Electric Vibration Generators* — Certain crystals, notably quartz and Rochelle salt, undergo changes in physical dimensions under the action of an electric field applied along certain crystallographic directions. The conditions for maximum amplitude of vibration are similar to the magnetostrictive vibrators. Since the currents involved are very small the heat dissipation problem is less important and vibrational frequencies are possible to 200,000 cps and more. However, the total frequency-amplitude product obtainable from the type of vibrator is extremely small. The magnetostrictive and piezoelectric vibration generators belong to a class of high-frequency, low power output instruments.

B. Sonic Vibration Generators

1. *Electromagnetic Vibration Generators* — The magnetic field of a solenoid directed to the center of a beam fixed at both ends will exert a bending load on the beam proportional to the ampere-turns and demagnetizing factors of the magnetic circuit. If the magnetic field is caused to fluctuate as when an alternating current is applied to the solenoid, the beam will be set in flexural vibration. By adjustment of the electromagnetic field frequency such that it is equal to the natural resonant frequency of the beam, the amplitude of flexural vibration can be maximized. This relatively simple arrangement can produce vibrations up to 1200 cps when a variable-frequency-output generator is available. The frequency-amplitude product obtainable is higher than

Fig. 6—Microstructure of an Al-Fe alloy solidified rapidly, no induced vibration. X150

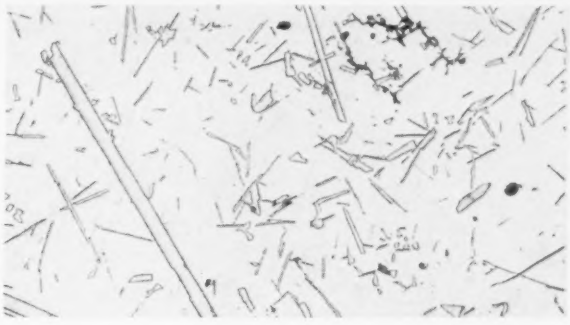


Fig. 7—Al-Fe alloy microstructure attained by fast solidification, with vibration. X150

from either magnetostriction or piezo-electric vibrators.

2. *Pneumatic Vibration Generators* — This very simple piece of equipment finds common use in commercial sand molding tables. Essentially the mechanism consists of a two-port chamber and a spring-loaded piston. Compressed air forces back the piston on one stroke; on the second stroke, the compressed air assists the spring-loaded piston to return to its original position. This latter action occurs with considerable force resulting in a sharp rapping action on the end of the chamber which can be transmitted to any base plate securely attached. This system is limited in frequency output to about 500 cps maximum by the spring constant and air pressure supply, but the force of the rapping action may be unlimited. A similar rapping type mechanism can be produced by anchoring the iron core of a solenoid to a heavy spring.

C. Vibration Coupling

A secondary problem, but one of considerable importance, is the transmission of generated vibrations to the solidifying melt. Two methods have been used:

1. Vibrating the crucible or mold holding the liquid metal. It has been claimed that a large amount of vibrational energy is lost when the solidifying charge shrinks away from the mold wall. However, the experience gained from the work reported here did not appear to substantiate this.

2. Inserting a probe actuated by the vibrator into the liquid metal. This has the attractive feature of not requiring the acceleration of a large metal mass. On the other hand, the effective transmission of vibrational energy to all parts of the melt is questionable.

Experiments with an Electromagnetic Vibrator— previous investigators generally used vibrators delivering frequencies of the order of 500-10,000 cps. The thought that grain refinement derived from fragmentation of crystallites seemed to demand the highest available frequencies. For the first phase of this program of research, an electromagnetic vibrator was selected. This generator was capable of delivering vibration frequencies up to 1200 cps. The vibrational amplitude could be controlled through the driver voltage although the overall range of accelerations which could be obtained with this type of vibrator was rather small, the maximum being about 980 cm/sec^2 (one G).

The general experimental conditions for solidification of metals were chosen arbitrarily. To achieve homogeneous solidification conditions, free of lateral thermal gradients, a furnace was constructed to provide uniform, controlled cooling rates. Specimens, approximately ¾-in. in diameter and 6 in. long, were melted under commercial fluxes, in Vycor tubes, and then subjected to vibration by means of a ⅜-in.-diameter quartz rod suspended in the melt from above and immersed in a depth of about 1 in. The quartz rod was in turn driven, or vibrated, by the electromagnetic vibrator adjusted to deliver either 900 or 60 cps. Controlled axial cooling rates of 0.14 and 0.90 in./minute were used.

Three characteristic alloys were used, namely 2 S aluminum, aluminum + 10 per cent zinc, aluminum + 4.5 per cent copper (commercial 195 alloy). Each of these alloys was subjected to the following solidification conditions:

(a) Vibrated at 0, 60, 900 cps.

(b) Vibrated under variations in driver voltage from 0-10 volts.

TABLE I—Grain Size Measurements on Rapidly Solidified Al-Cu Alloy Ingots (3⅛ in. diam.)

% CU	CONTROL INGOTS	VIBRATED INGOTS
0	Columnar grain almost through the ingot section	
1	Columnar grain through the ingot section	
2	Columnar grain through the ingot section	
3	½" columnar grain penetration; equiaxed 1-2 mm.	½" columnar grain penetration; equiaxed grains 1-2 mm.
4	½" columnar grain penetration; equiaxed grains 2-4 mm.	¼" columnar grain penetration; equiaxed grains 0.5 mm.
5	¼" columnar grain penetration; equiaxed grains 1-2 mm.	⅛" columnar grain penetration; equiaxed grains 1 mm.
		¼" columnar grain penetration; equiaxed grains 1 mm.
		⅛" columnar grain penetration; equiaxed grains 0.5 mm.
		¼" columnar grain penetration; equiaxed grains 0.5 mm.

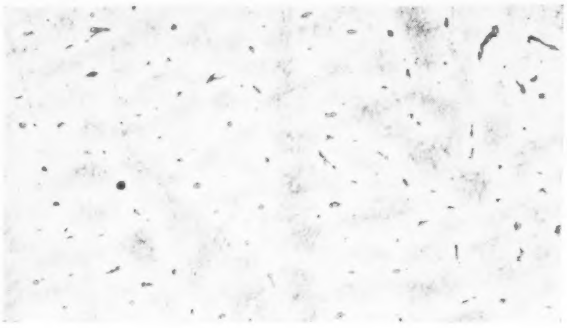


Fig. 9—Slowly solidified without vibration, 2% Cu-Al alloy shows this microstructure. X75

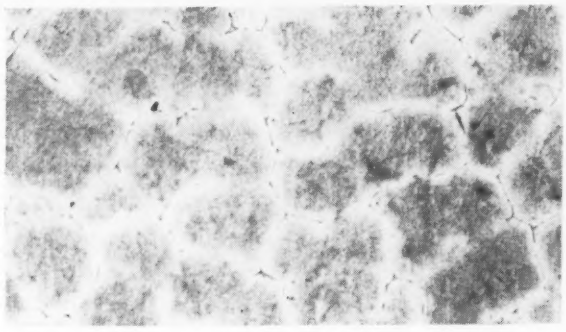


Fig. 10—With vibration, slowly solidified 2% Cu-Al alloy yields this microstructure. X75

(c) Solidified at 0.14 and 0.90 in. per minute. The solidified rods were examined metallographically for grain size and structural condition.

The results of the work may be summarized:

(a) Vibration during solidification under the conditions described produced no significant grain refinement although with increasing vibration amplitude a somewhat smaller grain size was noted.

(b) Residual liquid metal which solidified last as eutectic tended to collect in larger pockets when under the influence of vibration.

These experiments, while largely negative in results, are of value in demonstrating that whatever effects vibration might produce in cast structures, critically controlled conditions would have to be recognized and practiced.

At this point, a reconsideration of the probable nature of the effect of vibration during solidification seemed warranted. It has been variously proposed that vibrations, transmitted through a melt during solidification, act to fragment the primary crystallites, thereby introducing a secondary source of grain nuclei multiplication. Such a mechanism would seem to be predicated on the use of a frequency close to the natural frequency of the crystallites. For this reason much previous work has been concerned with the choice of frequency.

As an alternative point of view, the function of vibration may be regarded only as a source of turbulence and mixing within the melt. Grain refinement, then, finds its origin in the prevention of the act of consumption of small nuclei by larger ones by virtue of a sort of imposed "Brownian motion." If the mixing mechanism is valid, it can be expected that neither frequency nor amplitude is a singular variable, but rather the frequency-amplitude product. In other words, the acceleration imparted to solid particles relative to the liquid is the critical factor.

The "turbulence and mixing" hypothesis suggests three basically important factors:

(a) A large frequency-amplitude product to impart optimum acceleration to solid particles within the melt.

(b) A large volume of liquid to prevent diminution of the mixing action by side wall friction.

(c) A relatively long time of solidification to permit the formation of an optimum number of crystal nuclei.

Experiments with a Pneumatic Vibrator—If the necessity for high frequency is no longer considered of vital importance, high vibrational energies can be easily achieved by the use of pneumatic vibrators. A spring-loaded vibrator with a 1-in.-diam piston, actuated by compressed air, such as those which find common use in commercial sand molding tables, was chosen. This vibrator operates at about 200 cps. The vibrator was firmly locked to the under side of a heavy steel plate. To the upper side of the steel plate, a thin-walled cylindrical iron mold (3¼-in. diam x 6 in. high) was clamped by means of four tie-rods.

The mold and vibrator were therefore firmly coupled and the coupling efficiency was very good. Vibrations imposed on the molten metal during solidification were often so vigorous as to sporadically eject metal from the mold.

Trial castings of aluminum-copper alloys solidified with and without vibration showed significant results immediately. A pronounced macro-grain refinement was noted in those cylinders solidified with vibration. With this arrangement it was not feasible to exercise as close control of the thermal history of solidification. For this reason, a mold preheated to color temperature prior to the pour, was taken as characteristic of a slow rate of cooling. In fact, complete solidification required about five minutes. A measure of chill casting was achieved by pouring

TABLE II—Grain Size Measurements on 1½-in.-diam. Ingots Solidified Slowly

% Cu (nominal)	Grain Size (mm.) of Vibrated Ingots	Grain Size (mm.) of Unvibrated Ingots
1	0.5	
2	0.5-1	1-2
3	1	3
4	0.5-1	1-3
5	1	1-2
7	0.5-1	3-4
8	0.5-1	2
9	0.5-1	3-4

Fig. 11—Microstructure of 3% Cu-Al alloy solidified slowly and without vibration. X75

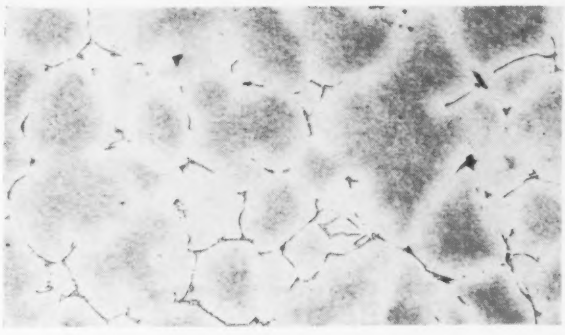


Fig. 12—Structure of same 3% Cu-Al alloy solidified slowly, but with vibration. X75

into unpreheated molds. The solidification time in this case was shortened to about one minute.

Having been satisfied by preliminary tests that this experimental arrangement was capable of producing the effects variously reported in the literature, a planned program of study was initiated to cover the following factors:

1. General effect of increasing alloy content
2. Effect of rate of solidification
3. Effect of vibrational intensity
4. Effect of ingot cross-section
5. Effect of the nature of the primary crystallites.

The details of experiments and results may best be considered separately.

Effect of Alloy Content on Grain Refinement—Binary aluminum-copper alloys with copper contents varying from 1-10 per cent were chosen for study. Although the solubility limit of copper in aluminum extends to 5.7 per cent, the appearance of eutectic persists to as low as 2 per cent copper because of the nonequilibrium nature of solidification. This series of alloys therefore served to illustrate the effect of increasing amounts of eutectic surrounding primary dendrites of solid solution.

Twenty cylinders in all were cast. Ten, with 1, 2, 3, 4, 5, 6, 7, 8, 9, 10 per cent copper, respectively, were solidified in the mold assembly without vibration and are referred to henceforth as "control" ingots. Ten with the same copper contents were solidified under the influence of as much vibrational energy as the mechanism could produce. In all cases the mold was preheated to provide a slow rate of solidification. Both the control and vibrated ingots were poured from the same melted charge and, as nearly as could be controlled, at the same temperature. The resultant cylindrical ingots had the approximate dimensions of $3\frac{1}{8}$ in.-diam x 5 in. long.

The ingots were sectioned vertically and macro-etched. Actual measurements of macro-grain sizes were rather difficult to make with the control ingots, because of the very large irregular grains, and with the vibrated ingots, because macro-etching does not suitably resolve grains of the order of less than 1 mm in diameter. The measurements reported were made by actual lineal measurement of a large number of grains. The area of examination was chosen well away from the bottom end where the chilling effect of the base plate was operative.

In Fig. 1 the results are shown graphically as a function of analyzed copper content. Approximating bands were drawn through the data. Although, if the true grain size in each ingot were uniform in the area under examination, the largest observable grain diameter should be recorded, it was decided to take more conservative (*Please turn to page* 260)

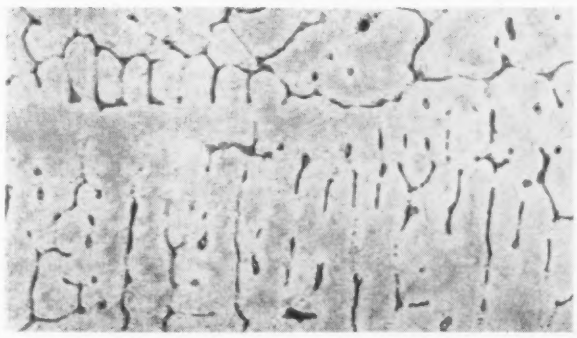


Fig. 13—Not vibrated, slowly solidified 5% Cu-Al alloys show this microstructure. X75

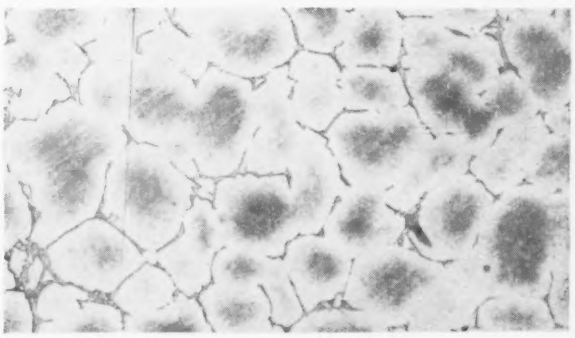


Fig. 14—With vibration, slowly solidified 5% Cu-Al alloys show this microstructure. X75

COREMAKING SPEEDED By Use of Heated Corebox

Fig. 1—Two-ounce cores made on 10-second cycle. Used to form casting at right

By W. M. PETERSON
Chemist
M. A. Bell Co., St. Louis

COREMAKING has been a bottleneck in many foundries for years, especially when numerous small and fairly intricate cores are required. Dielectric ovens have solved the problem in a number of instances, but for some foundries the capital investment in that type of equipment is too great.

A system of making and baking cores in one operation without the use of driers should find application in many foundries, provided the costs are not too great nor the operation and maintenance too complicated. Such a system has been developed and has proved successful in experiments conducted in the author's laboratory.

The equipment necessary is a suitable core blower and an electrically heated corebox. The only requirement of the core blower is that it be so constructed that either the corebox may be removed while still clamped or the blowing head be free to move away from the heated corebox. One of these precautions is necessary to keep the sand mixture in the blowing head from becoming too warm and driving off the moisture prematurely. Most standard core blowers will meet one of these requirements with very little modification.

Many electrically heated coreboxes are in common use today for shell molding, so considerable experience in constructing this type of box has been acquired by patternmakers. However, certain heating arrangements are much more practical than others for the process being described. Blow boxes already in service can be converted to heated boxes with a few simple modifications. Whether a new box is made or an old one converted, a heat reservoir is essential for even, continuous heating. This reservoir should weigh at least five times as much as the corebox, be the same dimensions as the sides of the corebox to which it will be attached and have sufficient thickness so that bayonet type heaters may be inserted. Gray iron seems to have the best heat properties of any metal for the heat reservoir.

For heating the reservoir, enclosed bayonet type resistance heaters are very satisfactory. These are manufactured in various lengths and watt ratings, so almost any corebox can be heated satisfactorily with

Fig. 5—Showing arrangement for heating corebox and making a hollow pipe T core

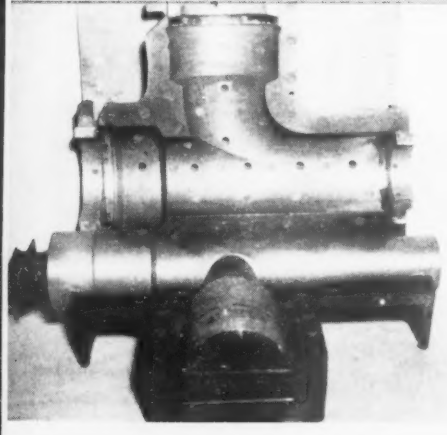


Fig. 6—Pipe T core in box. Blow holes at the parting line would be preferable

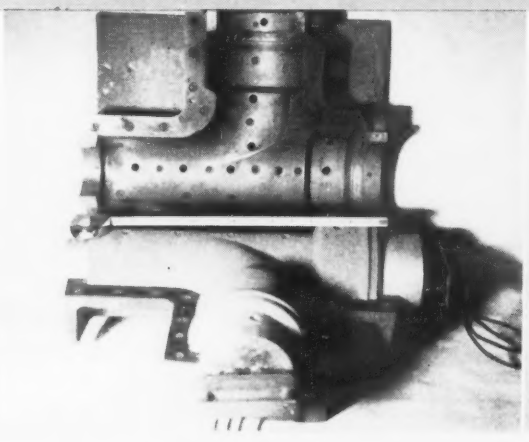
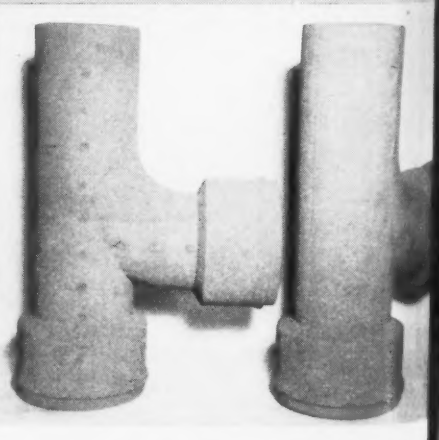


Fig. 7—Cores for 4-in. pipe T weig 8 lb. Made on 90-second baking cyc



g. 2—Group of cores made experimenly by use of the hot corebox method

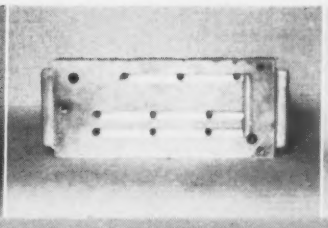


Fig. 3—Back of corebox showing common vent used to expedite removal of core

Fig. 4—Cavity in gray iron pipe T was formed by a 90-second core

standard heaters. The number of heaters required will depend upon the size of the core to be produced and the cycle which the corebox is expected to maintain. It is better to have more heaters than necessary and let them rest part of the time than have too few and have the operator waiting for the box to come up to temperature.

Constant heat control can be maintained by having an off-and-on thermostat actuated by the tip being embedded in the heat reservoir. Many standard thermostats on the market will serve the purpose, but care should be exercised to select one that will operate at temperatures up to 500° F.

The corebox itself should follow ordinary design with the possible exception that sand cavities, which are sometimes left open, should be enclosed with metal to facilitate the baking process. Venting should be adequate so that the sand cavity can be filled in the shortest possible time.

Venting is also necessary to allow the volatiles from the core sand mix an easy route of escape. Usually more vents are required than are usually placed in a blow box and they should be slightly larger, where possible. As many vents as possible should be brought to a common vent leading to the outside of the corebox (Fig. 3). This is necessary to expedite core removal from the corebox with a stream of compressed air.

Sand Mixtures—The sand mixtures are the most important part of the whole process. The binders used must set in a matter of seconds; complete their drying cycle by air drying; have no obnoxious odors; must not swell under heat; must not stick to the heated corebox; and last but not least, be in a price range foundries can afford. Two core sand mixtures were found which would meet these requirements, but undoubtedly more will be found if a further search is conducted.

For large cores such as the pipe core shown in Fig. 7 the following mixture proved satisfactory: 100 lb washed and dried silica sand (GF 60-80), ¼-lb corn flour, 3 lb dry core compound, 4 lb water, ½-lb release agent.

The mixing procedure is important. Add the dry ingredients and mix for a few seconds. Add the water and mull for four minutes minimum. Add the release agent and mull for one minute. Thorough mulling is necessary; a paddle mixer will not do a satisfactory mixing job.

For cores which are to be stored for a period of time or which will remain in a green sand mold for some time before pouring, the following mixture proved satisfactory: 100 lb washed and dried silica sand (G.F. 60-80), 2 lb dry core compound, 4 lb water, 1 lb core oil.

Here again the mixing procedure is important. Mix the dry ingredients for a few seconds. Add water and mull for four minutes minimum. Add core oil and mull for two minutes.

While washed and dried sand was used in the illustrations, any reasonable core sand will serve. Finer sands work better than (*Please turn to page* 232)

Fig. 8—Exploded view of 4 x 8-in. corebox. Resistance heaters at left

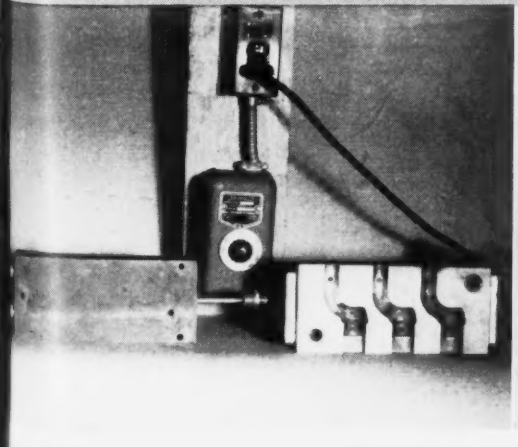


Fig. 9—Showing hollow interior of pipe T core. Thickness ½ to ⅝-in.

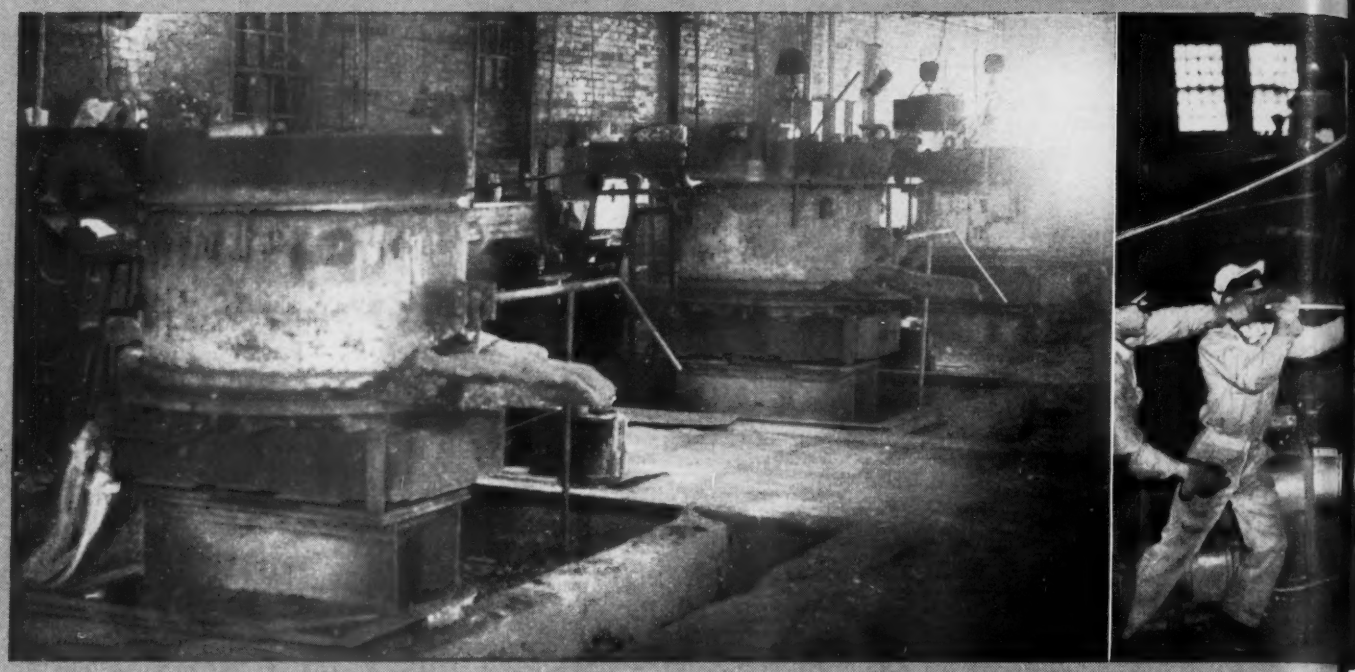


Fig. 2—Each of these three furnaces melts about 1200 lb per hour, 24 hours per day, six days a week, and holds molten metal over week-ends

Low-Frequency Induction Melting Employed in Malleable Foundry

By CURTIS POLLOCK
Plant Superintendent
I. F. Sales Co. Inc.
New Philadelphia, O.

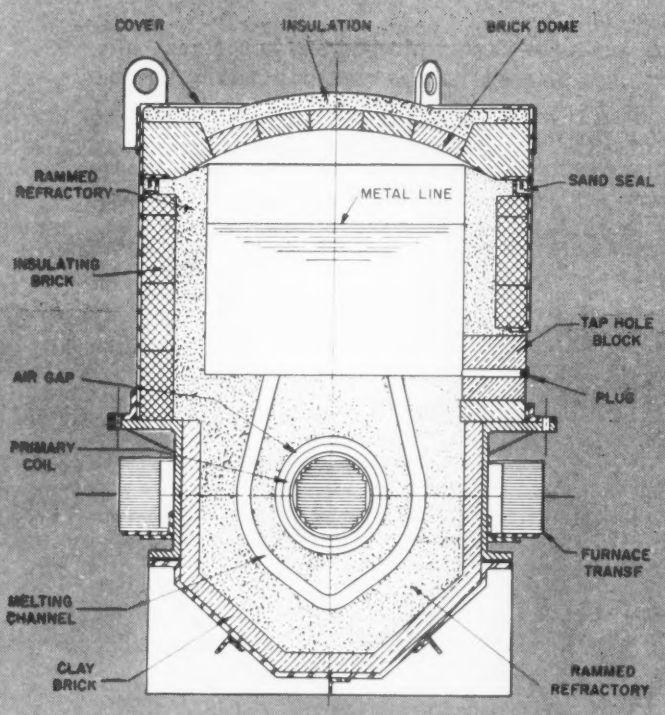


Fig. 1—Energy for heating is applied to metal in channel below hearth. Linings are of high-grade refractory rammed in place inside heat insulation

Fig. 3—Cover is lifted while solid metal is taken from buggy. Charge is dropped into molten metal and melted

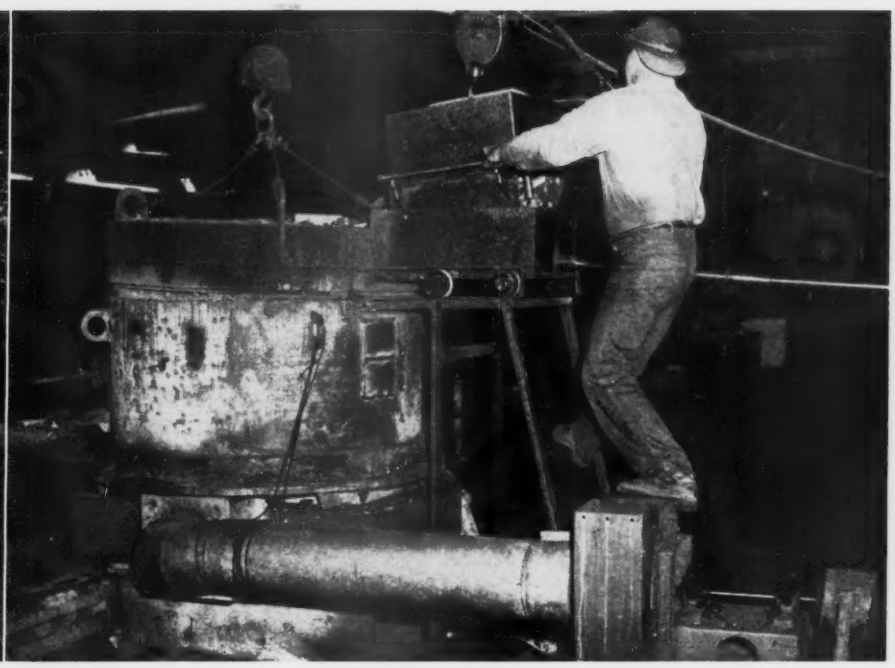


Fig. 4—Close-up shows wheeled buggy into which charge is dumped from weighing bucket and dried for 20 minutes

HOW can a medium size foundry melt iron for malleable castings at minimum cost and still maintain optimum uniformity in quality? This was a paramount question with the I. F. Sales Co., Inc., New Philadelphia, O., producer of malleable iron castings.

The solution found to the problem may prove significant in ferrous melting practice because of the economy and other highly favorable results achieved through recent adoption of low-frequency induction melting furnaces. They are the first of this type to be used in producing malleable iron in this country.

It may be recalled that this same type of furnace has worked an almost complete revolution in brass melting over a period of some 35 years. Whether it can have anything like comparable results in ferrous foundries remains to be seen.

The company originally decided to install one single-phase, 525-550-v, low-frequency Ajax-Wyatt furnace of 350-400-kw capacity to be used for holding, superheating or duplexing. This furnace, Fig. 1, has a maximum capacity of 5000 lb of metal and, though not purchased for melting, has a normal melting capacity of 1200 lb an hour and can melt 1600 lb an hour. Although the makers were uncertain as to the life of linings in ferrous melting, the author was convinced that the life would be relatively long because the maximum temperature to which linings are exposed is not above that of the metal melted.

Early experience with this furnace showed that linings could be made to last 8 to 10 weeks. Subsequent experience, even when the furnace is used for melting, has shown a probable lining life of approximately three months. Relining costs now promise to become a relatively minor factor in total costs.

After charging the furnace with molten iron, it was decided to try it for melting. This involved charging cold metal into the liquid metal above the hearth. It was found that such charging could be done safely, if care was exercised in having the charge moisture-free, and such charging is now done regularly. Molten metal is always kept on the hearth to a depth of at least 6 in., although the tap hole is at hearth level. All heat is added in the heating channel below the hearth where the metal is actually a part of the one-turn secondary of the transformer supplying energy for heating.

Metal in this heating channel is subjected to magnetic forces that keep it circulating rapidly both through the channel and over the hearth. In fact, the circulation is so rapid that all liquid metal above the hearth is kept in fairly violent agitation. This circulation insures uniformity in the quality of metal within the furnace. Energy supplied to the primary coil is transmitted rapidly to the molten metal and by it to the new charge being melted.

As later described, controls make it possible to supply energy via the induction coil at the desired rate. If the rate is high, the temperature of metal in the heating channel is increased and circulation is correspondingly more rapid. That the temperature of metal in the heating channel is the highest of any in the furnace is indicated by the fact that the linings there are eroded, though very slowly; hence the heating channel increases slowly in sectional size.

Although no actual temperature measurements have been made, it is believed that temperatures in heating channel walls rise considerably when input exceeds a given value, as then the channel walls erode more rapidly and the lining in the channel tends to fail

Fig. 5 (left)—Close-up of control panel of one furnace shows, in top row, meters indicating voltage, secondary current, kw and kwhr. Integrating impulse counter at the center is set for a given kwhr input

Fig. 6 (right) — During tapping, 400 lb of metal runs by gravity to bull ladle held over a pit by hoist. Then tap is plugged and ladle moved for pouring

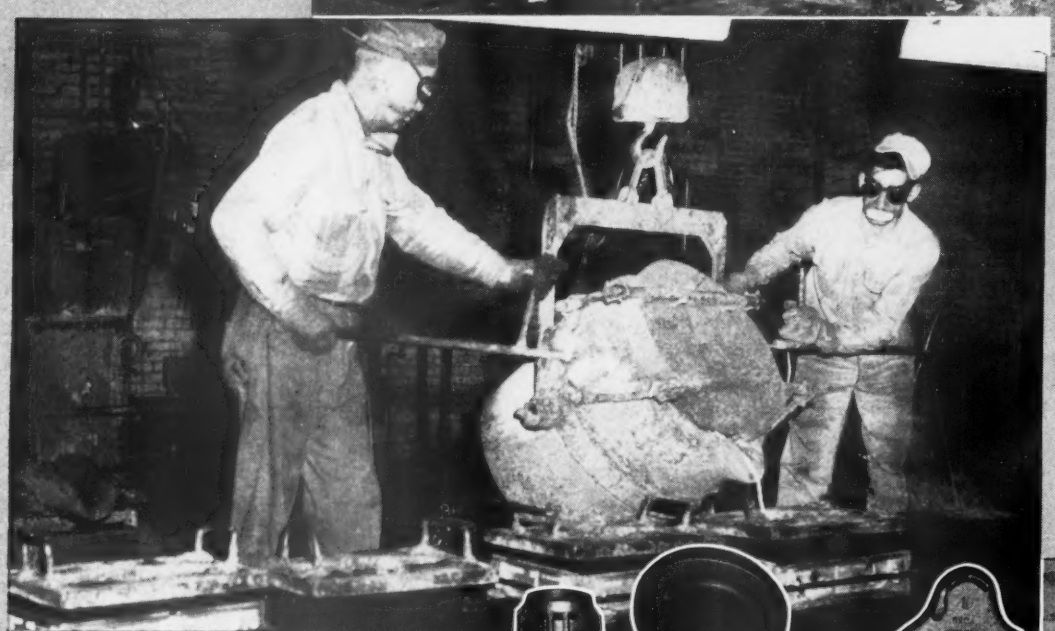


Fig. 7 (left)—Molten iron is poured into sand molds on merry-go-round conveyor. Castings cool on conveyor and reach shakeout just before each dolly reaches unloading station

Fig. 8 (right)—Castings in this group are typical of the ones produced in the I. F. Sales Co. foundry with the practice outlined here

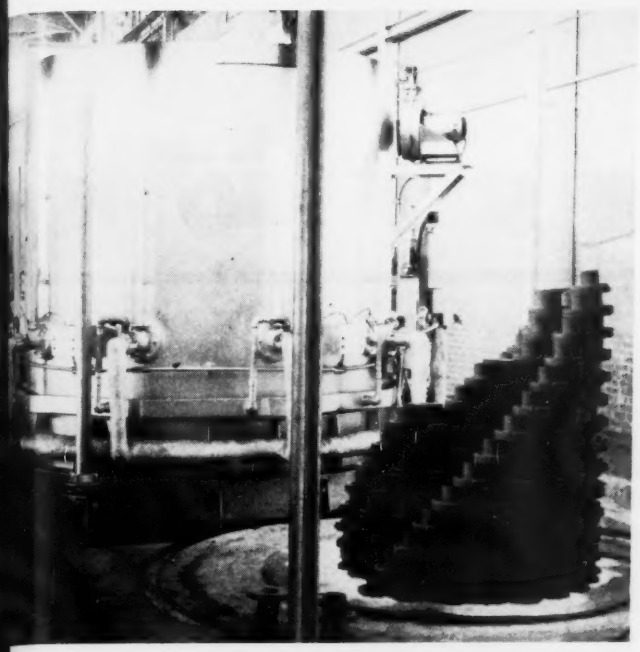


Fig. 9—Loading of radiant-tube type malleablizing furnaces is done as shown at right or in metal boxes

sooner. Experience has shown that, when melting input averages 340 kw or below, lining life is approximately three months when the furnace operates 24 hours a day, six days a week. It is believed that lining life can be increased further with added care and experience. This input is sufficient for one furnace to melt 1200 lb of metal an hour. Melting in the first furnace proved so satisfactory that two duplicate furnaces were ordered and all, Fig. 2, have now been in almost constant use for several months.

When a given voltage is applied to the primary winding, the corresponding primary current is indicated on an ammeter. If the voltage remains fixed, primary current increases very slowly as channel linings are eroded because there is a corresponding increase in cross section and the same increase in the sectional area of the secondary conductor of molten metal. Observation of primary current readings give ample warning of any potential lining failure and the furnace can be shut down before actual failure results.

All of the three duplicate furnaces now in use are run 24 hours a day, six days a week. They do all melting required in this foundry. No other furnaces are needed. Over weekends, the induction furnaces are switched onto standby setting in which the current consumption is set and held so that input balances heat losses. Consequently, metal in furnaces remains at fixed temperature until pouring is about to be resumed.

As the refractories used are supplemented above hearth level with extra insulation outside the refractory (see Fig. 1), heat losses are very low. Current cost for standby holding approximates 50 cents an hour per furnace with current at 0.9 cents per kw hr. As each furnace has its own bank of 420-kva capacitors and another bank is used on supply lines, a power factor of practically 100 is maintained during melting. An air-cooled autotransformer is employed to provide reduced voltage for standby and holdover periods.

Each furnace has a circular and slightly crowned cover that includes both refractory and insulation (Fig. 1). On the steel frame of the cover is an annular lip fitting into a circular sand seal. As the furnaces have no separate charging doors, the cover is lifted by a 1-ton hoist each time a new charge is added (normally about once each 20 minutes for a 400-lb charge), Fig. 3, and then is lowered immediately.

It generally requires about 5 seconds for the complete charging operation, from the instant the cover leaves its seat until it is returned to it. Consequently, the furnace generally is open for only three short periods, usually totaling about 15 seconds, during each hour and remains sealed at all other times. As metal level usually is some 20 in. above the hearth, very little oxygen can enter the furnace even if all gas above metal level is displaced at each opening.

No provision for maintaining an atmosphere is made, as so little oxygen enters. This small amount is consumed very quickly and without detriment. In fact, sealing is not always perfect and when a small crack is left at the seal, CO always burns along the crack, indicating that a reducing atmosphere is maintained above the metal.

Charge losses are negligible and never have been found to exceed 0.200 per cent carbon. Slag is so slight that it is skimmed off only once a week and is believed to consist chiefly of foreign matter on metal charged plus such oxides as may be formed and float above the metal level. During the weekend holdover, extra sand is added around the seal and furnaces are left on standby setting about half full of metal.

Once a furnace of this type is put into use, it is recommended that it never be left without electrical power input, presumably at least equal to heat radiated, as ultimate freezing of metal may disrupt the furnace. It has been found, however, that momentary power failures are not of significance in a furnace having metal at pouring temperature well above the hearth, *provided* that the blower (of which there is one for each furnace) for circulating air around primary coils continues to run.

Air moved by the blower is circulated around the primary coil to keep it at a safe operating temperature. When blowers main- (*Please turn to page* 266)

Cost of Induction Furnace Melting

(Estimated cost per ton of melt based on operation 24 hr per day, five days a week,[a] and with total power cost of 1c per kwhr. All costs vary slightly with local conditions.)

Power	$5.00	to $5.50
Holdover power	.48	.48
Labor[b]	2.60	2.60
Refractory[c]	1.75	1.75
Total[d]	$9.83	to 10.33

(a) In the foundry described, furnaces operate 24 hr. a day, six days a week.
(b) Labor here figured at $2 per man-hour, varies with locality.
(c) Based on 1600 melts and a total cost of $600 for each relining.
(d) Does not include metal losses, which are slight to negligible.

QUESTIONS

Stop plaster from sticking to pattern . . . . . .

Structure is coarse . . . . . Has foaming slag

Grain distribution . . . . . Casting iron pipe

Plaster Mold Release Agents

QUESTION Some time ago we believe we saw references in FOUNDRY to release agents used in plaster molding. Can you tell us what are being used?

ANSWER Apparently a wide list of materials is employed for parting releases in plaster molding, including potash soap (green soap) solution; petroleum jelly thinned with 2 parts kerosene; light lubricating oil; light oil 25 per cent and kerosene 75 per cent plus 1 per cent wetting agent; lard oil; paraffin oil, and ¼ lb of stearic acid in 1 pint of kerosene.

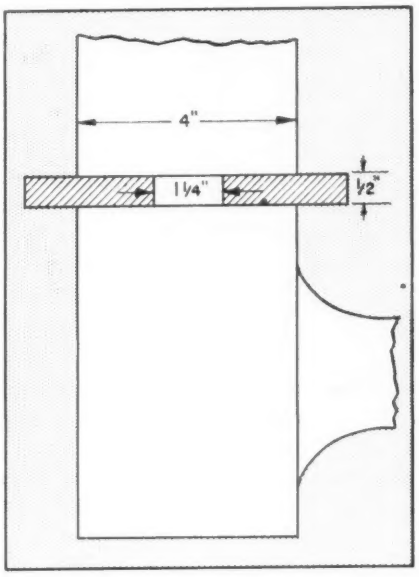
A number of proprietary release agents are available from foundry supply houses, and you might be farther ahead by purchasing one of them instead of experimenting. In any case the release agent should be applied as thinly as possible—preferably by spraying, so that it does not accumulate in corners and in deep pockets.

Open Structure Under Risers

QUESTION We have been making some iron gear castings recently which are fairly heavy, with metal sections up to 3 and 4 in. To avoid shrinkage we have been compelled to put heavy risers on them. Castings are poured with a 45 per cent steel scrap mix since a close-grain metal is required. When the castings are machined the metal appearance is satisfactory except immediately under the risers where it appears more open than the remainder. Can you suggest any method of providing a uniform appearance?

ANSWER You do not mention the riser diameter, but we suspect from your expression "heavy" that it is considerably more than the casting section to which it is attached. Since it is appreciably larger, it cools more slowly, and that usually results in larger grain size than in the thinner casting section which cools more rapidly.

Possibly you are using a much larger diameter than necessary,



Suggested method to eliminate coarse structure under riser

but some experimental work with possible loss of castings would be required to determine the most desirable size. One procedure might be to make the risers about the same size or slightly larger than the casting section; fill the mold through the gate until the molten metal rises just to the top, and then fill the risers with hot metal from the cupola.

Another possibility is use of neck-down or cut-off cores under the risers. These, as you undoubtedly know, are comparatively thin section cores with a small hole in the center which becomes highly heated, and permits good feeding. We do not know the size of the riser you are using so can only suggest the following: For 4-in.-diam riser, ½-in. thick with 1¼-in. hole; for 5-in.-diam riser, ⅝-in. thick, 1½-in. hole; for 6-in.-diam riser, ¾-in. thick, 1¾-in. hole.

Slag Foaming Causes Trouble

QUESTION From time to time, at varying intervals, we have had considerable difficulty, best described as foaming slag, with our 34-in. ID cupola. We have tried higher and lower coke beds, using the regular tion amount of limestone and soda ash; varying the air pressure; carefully sorting raw materials to eliminate nonferrous metals; varying the size of coke splits, and other measures.

ANSWER Foaming of slag usually is associated with both the chemical composition of the slag and the mechanical conditions of its occurrence. From the description of the process it would appear that the slag is too highly alkaline, largely because of the addition of soda ash. A normal ratio of flux to iron is around 3 per cent when the sprue does not carry too much sand and the scrap is not heavily rusted.

Addition of soda ash to limestone flux increases its alkalinity and fluidity, but that condition by itself will not necessarily cause foaming. When conditions are right, the slag can and will foam if the wind can cause an undue disturbance either because of tuyeres or position of the slag hole. For a 34-in. ID cupola, the slag hole should be about 3 in. below the tuyeres and about 1½ in. in diam. Tuyeres should be level, not sloped toward the well. Area of the tuyeres will be fully effective if it totals approximately 25 per cent of the cupola area. Tuyere area is measured at the windbox side.

If the slag hole is too close to the

ANSWERS

tuyeres, a "whipping" action will occur, and if it is too low, the erosion of the well is excessive. Each tuyere should carry an equal quantity of air into the cupola. This point can be checked by observing the amount of erosion in the melting zone near each tuyere. In areas showing the greatest burnout, reduce the area of the tuyere near the burnout gradually until it has evened out.

With a 34-in. cupola, a small tuyere ledge or bosh is sufficient. For example, 2 in. on a side should be ample to prevent bridging. The most effective coke size would be 3½ to 4 in. Coke bed height of 48 in. is satisfactory. Amount of coke per charge with around 30 per cent pig iron would be 125 to 140 lb per 1000 lb iron charge. Any steel content will require an increase of coke by 3 to 4 lb per 100 lb steel. Coke by itself cannot cause foaming of the slag but small coke (less than ½ in.) definitely can cause bridging and upset the entire cupola operation.

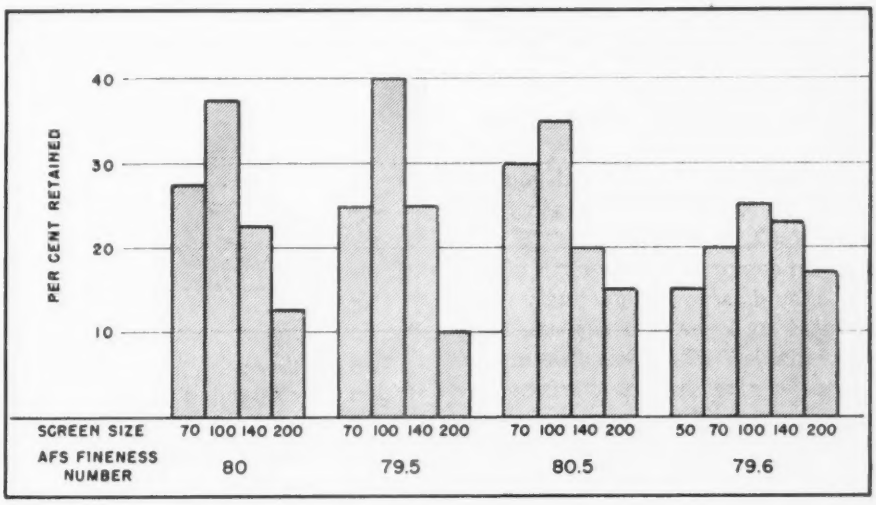
ineness and Distribution

QUESTION Can you tell us where we can obtain washed silica sand of No. 80 AFS grain fineness, and also advise what the sieve analysis of this grade of sand is?

ANSWER Washed silica sand of the desired grain size may be obtained from a number of sand suppliers, and we suggest that you look for names and addresses in the advertising section of FOUNDRY. Information on the sieve or screen analysis of that or other sands should be obtained from the supplier.

It might be pointed out that since the AFS fineness number is based on weight retained on given screens multiplied by a fixed factor, there always is the possibility of a combination of screen analyses which will meet the number.

For example, a screen analysis of 27.5 per cent on the 70 mesh, 37.5 per cent on the 100 mesh, 22.5 per cent on the 140 mesh and 12.5 per cent on the 200 mesh would give an AFS number of 80. A sand with 25 per cent on the 70 mesh, 40 per cent on the 100 mesh, 25 per cent on the 140 mesh and 10 per cent on the 200 mesh would give an AFS number of 79.5. A third sand with 30 per cent on the 70 mesh, 35 per cent on the 100 mesh, 20 per cent on the 140 mesh and 15 per cent on the 200 mesh would give an AFS number of 80.5 while a sand with 15 per cent on the 50 mesh, 20 per cent on the 70 mesh, 25 per cent on the 100 mesh, 23 per cent on the 140 mesh and 17 per cent on the 200 mesh would give an AFS number of 79.6. Differences in grain distribution of those sands is shown in the accompanying illustration.



Bar charts of four sands with about the same AFS fineness numbers which indicate quite clearly the differences in grain distribution

Seeks Sand for Casting Pipe

QUESTION In our foundry in Portugal we have an order for flanged cast iron pipe 3000 mm long with internal diameters of 50, 75 and 100 mm. We are going to cast it vertically, two pipes in each flask, with flanges, slag filter and pouring basin molded in cores. We have a big matchplate with the patterns of the pipes on which we set the cores before ramming up with a sand-slinger. We would like to know what the most suitable sand is, on the basis of the enclosed data on screen tests, fineness numbers, permeability, clay content and green compression strength of six available sands. We would like to make the pipe in green sand since our drying ovens are not big enough for the flasks.

ANSWER Although you do not mention the wall thickness of the pipe you intend to make, it appears to be similar to what we call "soil pipe," except that it is about double the length. Such pipe in this country has walls ¼ to ⅜-in. (6.35 to 11.25 mm) thick and are 5 ft (1524

mm) long. We can see no reason why your pipe cannot be made in green sand since that is regular practice here. Although perhaps such pipe can be poured vertically, pouring is done horizontally in this country.

Method is to place two pipe on the pattern board with a long central runner extending the length of the pipe. Runner is in the cope and has branches or gates which are spaced 2 in. apart and lead to the castings. With the 5-ft pipe, the usual practice is to space equally four downgates or sprues through which the metal reaches the runner. Pouring is done with an elongated ladle termed a "bathtub," which has four lips spaced the same distance apart as the sprues. With the longer pipe you intend to make, the length of the ladle should be increased to accommodate more lips. Possibly six lips for as many sprues might work satisfactorily, although it may be safer to use eight.

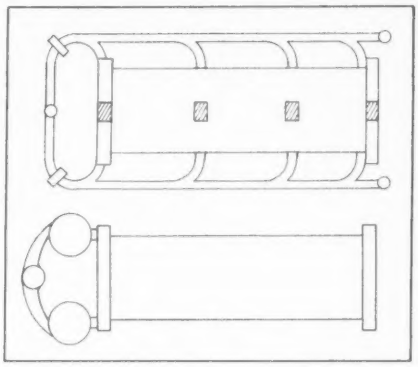
We believe that the sand you indicate as No. 3, with a grain fineness of 52, permeability of 75 and a green compression strength of 9.4 psi, should serve satisfactorily with about 4 to 5 per cent seacoal, if it is available. If the sand seems to be too coarse for the surface desired, you could try an experimental batch made up of 60 per cent No. 3 and 40 per cent No. 6 (silica—fineness 97), which will result in a sand of around 70 fineness. Addition of clay-free material might require addition of some bentonite, but try it first without.

It also might be pointed out that the cores for soil pipe also are green sand—made on seamless steel tube arbors perforated with holes. Arbors are about $\frac{7}{8}$-in. less in diam than the inside diam of the soil pipe. Moisten the arbors by dipping them in a tank of water, then place them under an overhead sand hopper which permits the sand to fall on the arbor in a thin stream from a height of about 3 ft (814 mm). Arbor should be rotated slowly to permit an even coating of sand. A long blade called a "doctor" is located on the stand where the arbor is rotating so that it automatically strikes off the sand to the proper thickness. Cores are not coated with any material.

Pour Cylinders Horizontally

QUESTION We are making cast iron cylinders and liners which are poured in the vertical position. These range from 8 to 18 in. in diam and from 6 to 8 ft long with external flanges at each end. Inquiries are being made on why we do not cast them horizontally. We tried pouring them that way but had excessive scrap from not being able to hold the core straight and trouble in keeping them clean as any dirt seemed to hang under the core which made the casting unusable.

ANSWER Evidently your procedure in top-pouring the cylinders and liners is operating satisfactorily, but under the circumstances it appears that it may be a good idea to try pouring them horizontally,



Two methods of gating cylinders for pouring horizontally

and then select the method which gives the best results.

Two possible procedures are available for pouring in the horizontal position, and we are including a sketch showing them. One might be termed the conventional, and the other the shrink bob method advocated by Winte and Barlow. Details of the latter were given in the August, 1945 issue of FOUNDRY.

Conventional method shown in the top figure uses a split runner going along both sides with skimmer cores located at the bends. Gates are flat, finger type. Strainer core is located at bottom of sprue. Risers are placed on the flanges, and since these castings are 6 to 8 ft long, probably two more located equidistantly between the flanges might be needed. Preferably, use of cut-off cores at the juncture of riser and casting will aid in removal as well as in feeding.

The shrink bob method in the lower sketch uses two bobs as shown (the dimensions for castings up to 300-400 lb) which lead into each side of the liner through 1-in.-sq gates. The two bobs are as close to the casting as possible (1 in.) and are fed from a single sprue through runners entering at a tangent. Gates from shrink bobs into casting are 1 in. sq and are half in cope and half in drag. Gate from sprue to shrink bob is in drag and is 1 in. high; $\frac{1}{2}$-in. wide at top and $\frac{3}{8}$-in. wide at bottom. Shrink bobs are 3 in. in diam, extending at least 4 in. above highest part of casting, and $2\frac{3}{4}$ in. below the bottom of the gate leading from shrink bob to casting.

If your cores do not stay straight, it would indicate that you need some reinforcing rods or perhaps some chaplets to keep the core from bending.

Wants to Salvage Copper Wire

QUESTION Information given us on an earlier occasion helped us straighten out a problem, and now we have another. We have available in our plant approximately a ton of No. 1 or No. 2 copper wire per month, and would like to know the procedure to get 85-5-5-5 alloy castings. We are guessing that the best plan would be to use about half ingot and to add the proper amount of copper wire, tin, lead and zinc to fill the pot. We have an oil-fired crucible furnace taking a No. 80 crucible. We have a pyrometer, and believe we are using standard procedure.

ANSWER Since you mention that the scrap wire is available in your plant, it appears that it is the by-product of another operation and presumably is covered with insulation. You might save a lot of headaches by selling it to a scrap dealer. If you want to try your hand, however you first will have to remove the insulation. Naturally the resulting wire will be in "loose" form, and for best results it should be compressed into small rectangular bundles called "cabbages."

Loose material is quite bulky and hard to handle—probably a No. 80 crucible packed tightly with loose wire would not give much over 60 or 70 lb of metal. Even using a heel of molten metal in the crucible to start would require several charges to get a pot full of molten

(*Concluded on page* 116)

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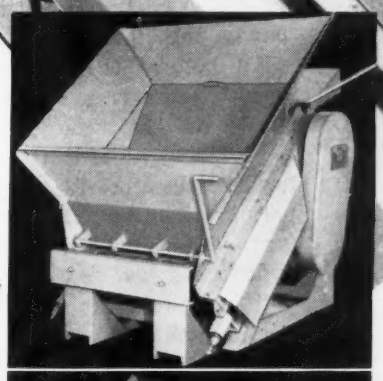
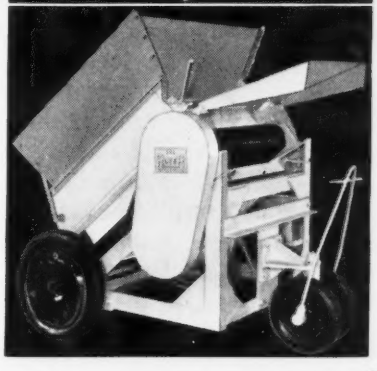


STATIONARY MODEL NYS-E



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(*Concluded from page* 114)
metal.

We believe you will be much further ahead by melting the copper wire, pouring it into ingots and using the ingots for alloying into the 85-5-5-5 composition—preferably analyzing each batch of ingot. In that way you would always be sure to produce the desired alloy.

To melt down the copper wire, assuming it is in loose form, we suggest the following: Place the empty crucible in the furnace and get it white hot. Then charge in a small amount of heavy copper scrap to form a small "heel," covering with a small amount of *dry charcoal.* As soon as it is molten and hot, start charging the copper wire, pushing it down into the molten heel. When the heel gives signs of cooling off, stop the addition, cover the crucible, and let the metal get good and hot again. Repeat the cycle until the crucible is full. Deoxidize by adding 4 oz of 15 per cent phosphor copper, using a phosphorizing cup to permit the Cu-P to be plunged to the bottom of the molten metal. Stir slowly, skim and pour into ingot molds.

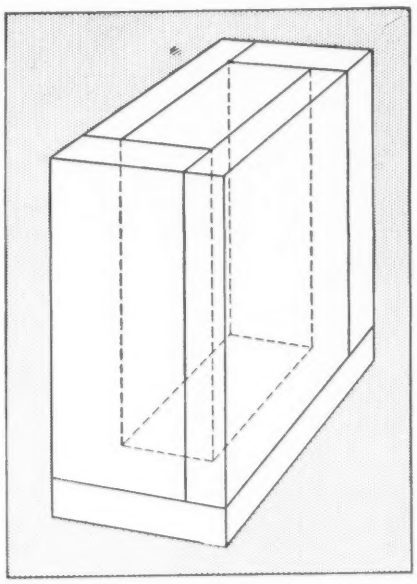
As far as alloying to make the 85-5-5-5 composition is concerned, the Pb, Sn, and Zn have melting points of 620.6, 541.5 and 787°F respectively. Boiling or volatilization points of both Pb and Sn are considerably above the temperature of molten copper, and consequently there is no need to fear loss. However, since they melt at comparatively low temperatures, it perhaps is best that they be added about 10 minutes before the pot is pulled from the furnace. Zinc boils at about 1706°F. Consequently to hold the loss to a minimum, it should be added not more than 5 minutes before pulling.

If you want to try to make the alloy with composition ingot to form the heel using, as you indicate, half a charge, or 120 lb, follow the procedure indicated previously. In particular, you should have the crucible hot to start. When the ingot is molten and hot, add 102 lb of copper wire, poking it down into the molten heel so it will dissolve, watching for chilling tendency. Then bring the metal up to pouring temperature. Add 6 lb each of pig Pb and Sn, stirring them in with a slow, pumping motion. If there is no drop in temperature, add 7 lb zinc. Then deoxidize with 2 to 4 oz of 15 per cent phosphor copper in a phosphorizing cup, stirring in. If temperature is right, pull the pot, skim and pour.

Cast Heavy Blocks in Chills

QUESTION We have been having considerable trouble in trying to produce solid blocks 5 x 8 x 12 in. in aluminum alloys No. 108 (3 Si-4 Cu) and No. 356 (7 Si-0.30 Mg). We have poured them from 1200 to 1450°F, and given consideration to risering to the extent of 3 to 1, placed in every suitable position. Major problem is porosity in small pinpoint appearance with dark specks. We have used dry nitrogen in several heats 5 to 10 minutes before pouring also.

ANSWER So little information is given with respect to your trouble that it is difficult to suggest any remedy. However, it occurs to us that you are trying to produce these chunks without chilling. and solidification is so slow that it is difficult to eliminate porosity —not to mention the possibility that the sand might be on the wet side or is somewhat tight.



Chills applied on all sides except top promote freezing

Our suggestion is to resort to heavy chills on all sides except the top which is left open. In fact if there are enough pieces we would use an iron mold. Extend the top of the mold to act as the riser, say 6 in., which later is cut off. After you determine how far down the pipe or shrink hole runs down in the riser, you probably can shorten the length. We believe that the blocks can be poured successfully into the open top.

Cores Subject to Penetration

QUESTION For some time we have had such trouble with our cores as penetration, washes, veining, etc. We are enclosing screen analyses of the various sands used, as well as the various mixes employed for different types of work and of their physical properties. Castings weigh from 1 to 25,000 lb, and pouring temperature of the iron ranges from 2500 to 2675° F.

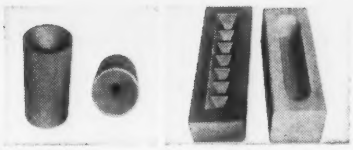
ANSWER From the screen analyses given, the lake sand shows an AFS grain fineness of 38 with 93.5 per cent distributed on the 40, 50 and 70 mesh sieves, and 44.7 per cent on the 50 mesh. The bank sand shows a fineness of 52 with 98.4 per cent on the 70, 100, 140 and 200 mesh sieves, and 52 per cent on the 100 mesh. The mixture of 75 per cent lake sand and 25 per cent bank sand shows a fineness of 50 with 85.9 per cent on the 40, 50, 70 and 100 mesh sieves, and 20.6 per cent on the 40 with 33.5 per cent on the 50 mesh sieve.

We believe that while part of your trouble from penetration is due to the coarseness of the sand, the washes and veining result from low hot strength of the cores, which permits them to collapse or disintegrate too soon. Several remedial approaches are available, and you will have to determine by experiment which will operate to best advantage. These include use of a finer sand and addition of molding sand, clay, bentonite, iron oxide, etc.

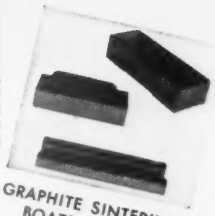
You might try a mixture of 50 per cent of each of the sands mentioned instead of the present 75-25 per cent mix, which theoretically would result in a sand of about 62 fineness. Make up such a batch of sand sufficient to make a few cores in each of the several types you mention.

If you still have the trouble, you might try addition of 1 to 2 per cent fireclay or bentonite, or of iron oxide, and again observe the results. Possibly some of your difficulty can be overcome by application of a coating of blacking or core wash.

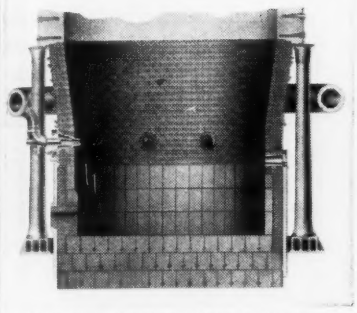
GRAPHITE CRUCIBLES



GRAPHITE MOLDS



GRAPHITE SINTERING BOATS & TRAYS



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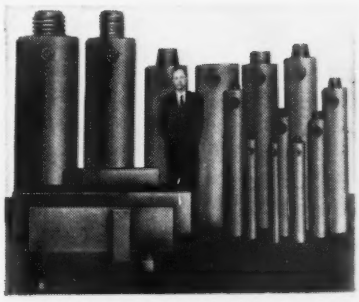
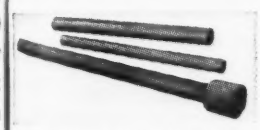
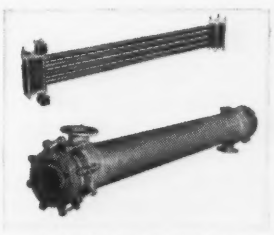


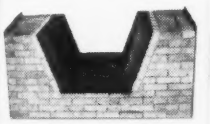
CARBON & GRAPHITE ELECTRIC FURNACE ELECTRODES



GRAPHITE FLUXING TUBES



"KARBATE" IMPERVIOUS GRAPHITE HEAT EXCHANGERS



CARBON LININGS FOR RUN-OUT TROUGHS

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- **Good thermal conductivity**
- **Excellent electrical conductivity**
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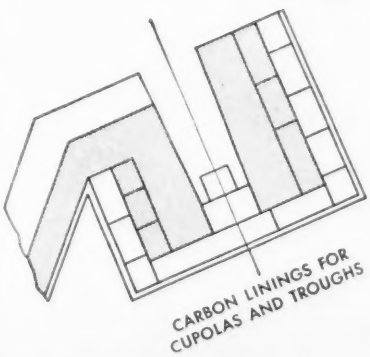

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Men of Industry

CARL H. Morken was made vice president-manufacturing, Kennedy Valve Mfg. Co., Elmira, N. Y. **Thomas S. Turkington,** controller, has been given additional responsibility as secretary. Mr. Morken, a graduate of University of Minnesota, joined the company last year as works manager. He was previously associated with Ohio Brass Co., Mansfield, O., Detroit Electric Furnace Co., Detroit, and Carondelet Foundry Co., St. Louis. Mr. Turkington was appointed general auditor in 1945 and was made controller in 1950.

♦ ♦ ♦

John L. Keating, formerly senior consulting engineer, W. W. Slocum & Co., has been named production manager, Cooper Alloy Foundry Co., Hillside, N. J. Mr. Keating was production manager of the nonferrous foundries, Bendix Aviation Corp., Detroit, during World War II. **Morton L. Katz,** for 12 years in pattern-making and foundry operations at the New York Naval Shipyard, has been appointed Cooper Alloy's chief shell mold engineer. **Anthony A. Miano** has been named standards supervisor in the company's stainless engineering and machine works division. He has had 14 years of engineering experience with Walter Kidde & Co., and Resistoflex Corp., both of Belleville, N. J., and Pollak Engineering & Mfg. Co.

♦ ♦ ♦

Fred W. Dixon, formerly vice president-general manager, has been named president-general manager, Haven Malleable Castings Co., Cincinnati, succeeding **Albert J. Sprong,** who has retired following 52 years with the company. Mr. Dixon has been associated with Haven Malleable 8 years. **Robert O. Mayer** was made vice president-director. **William S. Edgemon** continues as secretary-treasurer. **Fred W. Geiger** and **William G. Hibbs** complete the board of directors.

♦ ♦ ♦

Ralph R. West, president, West Steel Casting Co., Cleveland, was recently elected president, Cleveland Engineering Society, for 1953-54. **William R. Spiller,** vice president, Harris-Seybold Co., was named first vice president; **Max B. Robinson,** dean of Co-operative Education, Fenn College, second vice president; **Irwin L. Seidel,** Cleveland Electric Illuminating Co., treasurer; and **Mary C. Manwell,** executive secretary.

♦ ♦ ♦

Thomas McMichan, works manager, and **Frank Stevenson,** assistant works manager, of the Grove City, Pa., plant, Cooper-Bessemer Corp., have been appointed special assistants to the president with headquarters at the Mt. Vernon, O., headquarters plant. **Willard Luli,** previously production manager, has been named works manager, and **Hugh Stevenson,** formerly superintendent, is now assistant works manager, Grove City. **Kenneth Martin** has been appointed production manager, **Guy Gahagan** general superintendent, and **Clarence Evans** shop superintendent, day shift, Grove City.

♦ ♦ ♦

Gordon B. Carson, formerly secretary-manager of engineering, Selby Shoe Co., Portsmouth, O., has been named dean of the College of Engineering, Ohio State University. Mr. Carson was graduated from Case Institute of Technology in 1931 and received his master's degree in mechanical engineering from Yale University the following year. He taught at Case from 1932-1944, when he joined Selby Shoe Co. as assistant to the general manager. While teaching at Case he was research engineer and later director of research, Cleveland Automatic Machine Co., Cincinnati.

♦ ♦ ♦

W. E. Benninghoff, recently appointed vice president, Ohio Crankshaft Co., Cleveland, will continue

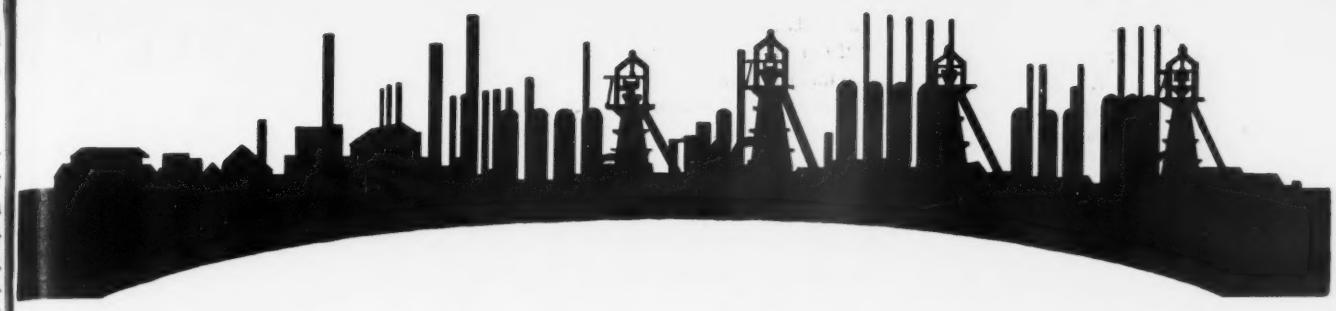
(Continued on page 120)

CARL H. MORKEN
. . . *Kennedy Valve v. p.*

ANTHONY A. MIANO
. . . *Cooper Alloy supervisor*

JOHN L. KEATING
. . . *joins Cooper Alloy Foundry*

MORTON L. KATZ
. . . *Cooper Alloy supervisor*



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(*Continued from page* 118)

as general manager of the Tocco Division. **Foster H. Pettay,** a vice president, was elected to the additional post of secretary-treasurer. **C. H. Kimmel,** vice president-general manager, was named a director.

♦ ♦ ♦

A. W. Hooper has been appointed representative in Alabama for Lewis-Shepard, Watertown, Mass., maker of industrial trucks, with headquarters in Birmingham.

♦ ♦ ♦

Alvin A. Shumann has been elected president, Lehigh Foundries Inc., Easton, Pa., and its affiliate Lehigh Mfg. Co., Lancaster, Pa., succeeding **Frank E. Shumann,** president since 1927, who has become chairman of the board. Alvin Shumann, a graduate of Rensselaer Polytechnic Institute, has been associated with Lehigh Foundries since 1928, and has been treasurer since 1934. **Fred C. Krauss,** who succeeds Mr. Schumann as treasurer of the company and its subsidiaries, has been controller since 1945.

ALVIN A. SHUMANN
. . . Lehigh Foundries pres.

FRED C. KRAUSS
. . . Lehigh treasurer

FRANK E. SHUMANN
. . . Lehigh chairman

ROBERT F. SMITH
. . . president, Indiana Steel

♦ ♦ ♦

Samuel J. Mabry, since 1948 Los Angeles representative, Industrial Products Division, Goodyear Tire & Rubber Co., Akron, O., has been appointed Atlanta district manager, succeeding the late John E. Ragan. Mr. Mabry joined the company in 1935 as a production worker in Los Angeles and in 1945 was transferred to Industrial Products Division there, later becoming office manager.

♦

George J. Bruyn, until recently chief of the Inorganic and Agricultural Chemicals Branch, National Production Authority, Washington, has returned to Hooker Electrochemical Co., New York, where he has been made administrative assistant to the general sales manager. He was previously manager of the Niagara sales office.

♦ ♦ ♦

William J. Grede, president, Grede Foundries Inc., Milwauke, recently received the gold medal for good citizenship of the national society, Sons of the American Revolution.

♦ ♦ ♦

Rodger C. Swift has been appointed abrasive engineer in the central Illinois area, Norton Co., Worcester, Mass. Mr. Swift, who joined the company in 1940, for 7 years has been in Brazil covering South American sales. **John W. McCue,** who formerly covered central Illinois, has been assigned to Chicago, succeeding **William N. Jove,** who has joined the staff of field engineers in the Chicago office.

♦ ♦ ♦

Kenneth B. Larkin has been appointed district representative, Frank G. Hough Co., Libertyville, Ill., to handle tractor sales in Washington, Oregon, Idaho, Montana and Canadian provinces of British Columbia, Alberta and Saskatchewan. **H. E. Thomas,** who formerly represented the company in that area has been transferred to territory comprising Illinois, Michigan, Indiana, Ohio, Kentucky and eastern Missouri.

♦ ♦ ♦

John Brandenburg has been appointed central sales manager, American Manganese Steel Division, American Brake Shoe Co., New York, with headquarters in Chicago Heights, Ill. A graduate of Yale University, Mr. Brandenburg joined the company in 1930 and became a plant superintendent following various positions in production. In 1934 he was transfered to Amsco sales, representing the Export and Brake Shoe & Castings Division.

♦

Dr. James H. Potter has been named professor of mechanical engineering and associate dean, Stevens Institute of Technology, succeeding **Dr. Richard F. Deimel,** professor emeritus, who retired from active teaching last year. Dr. Potter was formerly professor of mechanical engineering, University of Illinois.

♦ ♦ ♦

Robert F. Smith has been elected president and a director, Indiana Steel Products Co., Valparaiso, Ind. **John H. Bouwmeester,** vice president-manufacturing, was also elected a director and **Anthony Astrologes,** was named treasurer. **Ivan A. Dickey** has been made sales manager and **P. M. Wheeler,** midwestern regional sales manager in Chicago. Mr. Bouwmeester and **Charles A. Maynard** were re-elected vice presidents. Mr. Smith, with the company 16 years, has been vice president since 1948 and general manager since 1949.

♦ ♦ ♦

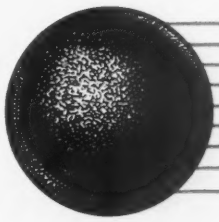
George L. Anderson has been appointed assistant to the general purchasing agent, American Brake Shoe Co., New York, responsible for purchase of foundry supplies, coke and ferroalloy, etc. Mr. Anderson joined the company in 1923 and was formerly a buyer in the New York office where he will continue to be located.

♦ ♦ ♦

Albert E. Forster was recently elected president, Hercules Powder Co., Wilmington, Del., succeeding **Charles A. Higgins,** president since

(*Continued on page* 122)

AMASTEEL



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DONALD E. THAL
. . . *Link-Belt plant manager*

A. A. THROCKMORTON
. . . *Kaiser Aluminum executive*

(*Continued from page* 120)

1939 and who will continue as chairman of the board. Mr. Forster joined the company in 1925 and has been vice president since 1951.

♦ ♦ ♦

Jack B. Bisanz has been appointed sales engineer in eastern Michigan and northern Ohio for the Foundry Products Division, Frederic B. Stevens Inc., Detroit, with headquarters in Flint, Mich., and the Detroit office. Mr. Bisanz was graduated from Northwestern University and was associated with Buick Motor Division and the Process Development Division, GMC, prior to joining Stevens.

♦ ♦ ♦

Lloyd Adam, for 10 years general sales manager, Erie Engine & Mfg. Co., Erie, Pa., has been appointed sales manager of the bucket division, Erie Steel Construction, there. Mr. Adam, who attended Thiel College, worked in the Erie laboratory of General Electric Co., Schenectady, N. Y., later engaging in specialty and retail selling.

Harvey V. Eastling, until recently general sales manager of the Pacific Division, Link-Belt Co., Chicago, has been appointed assistant general manager of the division, with headquarters in San Francisco. **Donald E. Thal,** assistant sales manager in San Francisco, has been appointed sales manager of that plant. Mr. Thal joined Link-Belt in 1935 and has been in engineering departments at the Chicago, Seattle and San Francisco plants.

♦ ♦ ♦

William H. Woodward was recently named vice president-sales, Ottawa Silica Co., Ottawa, Ill. **J. E. Pixley** has joined the sales department of the company.

♦ ♦ ♦

H. E. Fellows, who last year joined Lester B. Knight & Associates Inc., Chicago, has been elected a vice president and placed in charge of the survey division. Associated with the industry since 1920, for 7 years he has been in general foundry consulting work in United States and Europe.

A. A. Throckmorton, until recently chief of the products branch and acting deputy director, Aluminum and Magnesium Division, NPA, Washington, has returned to Kaiser Aluminum & Chemical Sales Inc., Oakland, Calif. Mr. Throckmorton's headquarters will be in the Chicago sales office and he will also direct alloys production operations at the Newark, O., plant. With the company since 1947, he previously was manager of metal procurement, alloys division manager and manager of metal control.

♦ ♦ ♦

Paul L. Hershfield, president, Mississippi Glass Co., has also been elected president, Walsh Refractories Corp., St. Louis, succeeding **J. L. Crawford,** who resigned recently. Mr. Hershfield continues as chairman of the board of the Walsh company. **A. J. Tomasek,** formerly chief engineer, has become executive vice president. **John J. Duggan** has been named sales manager of glass refractories. **W. K. Schweickhardt,** formerly Chicago district sales mana-

(*Continued on page* 124)

LLOYD ADAM
. . . *joins Erie Steel*

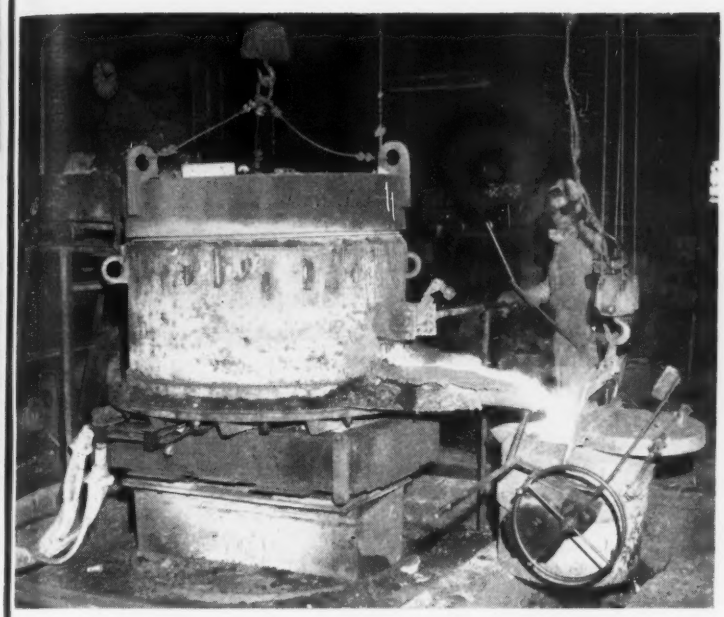
H. E. FELLOWS
. . . *Lester B. Knight v. p.*

A. J. TOMASEK
. . . *Walsh Refractories v. p.*

W. K. SCHWEICKHARDT
. . . *sales mgr., Walsh Refractories*

A REVOLUTION IN FERROUS MELTING PRACTICE

The first of its type to be used in production ferrous melting in this country . . . . .



Tapping one of the AJAX furnaces. Metal runs by gravity into a bull ladle. About 400 lbs. are poured at a time.

AJAX-WYATT ELECTRIC FURNACE

low frequency induction melting for malleable and gray iron castings performs easily and economically.

The single-phase, 525-550 V. low frequency AJAX-WYATT furnaces at 350-400 KW capacity installed at I. F. Sales Co., Inc., for malleable melting, holding, superheating or duplexing give these results.

Estimated cost per ton of melt based on operation 24 hours per day, five days a week, and with total power cost of 1c per kwhr. (Costs vary slightly with local conditions.)

Power	**$5.00**	**to $5.50**
Holdover Power	**.48**	**.48**
Labor	**2.60**	**2.60**
Refractory	**1.75**	**1.75**
Total	**$9.83**	**$10.33**

These furnaces run 24 hours a day, six days a week. Over weekends standby settings are switched on and current consumption is set and held so that imput balances heat losses. Charge losses are negligible and are found not to exceed 0.200% carbon. Slag is skimmed off only once a week. If power fails metal remains molten for about three hours.

Relining can be done by two men in about 14 hours, and drying in three days by gas flame. When the furnace is used for melting a lining life is approximately three months, with furnace operating 24 hours a day, six days a week.

AJAX-WYATT FURNACES PRODUCE QUALITY GRAY IRON AND GIVE THE CHOICE OF MELTING ALLOY IRON CASTINGS, THEREBY OPENING UP A WIDER FIELD FOR FOUNDRYMEN.

We invite your questions regarding the AJAX-WYATT electric furnace revolutionary method of ferrous metal melting.

AJAX ELECTRIC FURNACE CORPORATION

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Associated Companies: *AJAX Electro Metallurgical Corporation.* *AJAX Electric Co., Inc.* *AJAX Electrothermic Corp.* *AJAX Engineering Corp.*

DAVID MacGREGOR
. . . works mgr., Edward Valves

DR. J. D. HANAWALT
. . . Dow Chemical v. p.

JACK D. COLYER
. . . sales mgr., Bellevue Furnace

(*Continued from page* 122)
ger, has become sales manager of general refractories with headquarters in St. Louis. **Thomas W. Gill** has been re-elected secretary-treasurer of the corporation.

• • •

David MacGregor has been named works manager, Edward Valves Inc., East Chicago, Ind., subsidiary of Rockwell Mfg. Co., Pittsburgh. Mr. MacGregor, who received his early engineering training at Royal Glasgow Technical Engineering College, Glasgow, Scotland, completed his studies at University of Wisconsin, Purdue University and Illinois Institute of Technology. He joined Edward Valves in 1925 and became designer, chief draftsman, chief designer and has been chief engineer since 1943.

• • •

James V. Burrell has been named Michigan district sales representative, Electric Furnace Co., Salem, O., with headquarters in Detroit. Mr. Burrell has been associated with the company over 15 years.

Dr. J. D. Hanawalt, since 1946 manager of the magnesium department, Dow Chemical Co., Midland, Mich., has been named a vice president. **Dr. William R. Veazey** has retired from the company following 37 years of service, 26 years as a director. For the last year Dr. Veazey has been a research consultant. **Dr. Ray H. Boundy,** for the last year director of research, and **Donald Williams,** since 1949 director of sales, have also been appointed vice presidents.

• • •

Lester T. Moate, assistant controller, American Steel Foundries, and **Cedric P. Voll,** controller, Griffin Wheel Co., both of Chicago, have been elected to membership in the Controllers Institute of America.

• • •

Jack H. Eisaman has been appointed mid-western sales and service representative, International Graphite & Electrode Division, Speer Carbon Co., St. Marys, Pa. Mr. Eisaman was formerly associated with U. S. Steel's South Works, Chicago.

Jack D. Colyer has been appointed sales manager, Bellevue Industrial Furnace Co., Detroit. Mr. Colyer, until recently sales consultant for several Detroit companies, previously was vice president-sales manager, Wolverine Tube Co., assistant to the president, Pattern Foundry Co., and sales manager, Dix Engineering Co., all of Detroit.

• • •

Harry E. Beane, since 1947 general sales manager, has been appointed vice president-sales, the Bristol Co., Waterbury, Conn. Mr. Beane, with the company since 1920, was district manager in Birmingham and Pittsburgh until 1943 when he became sales manager of the instrument division.

• • •

William J. Healy, sales manager, turbine division, De Laval Steam Turbine Co., Trenton, N. J., will also be sales manager for the blower and compressor division. Mr. Healy became sales engineer for the company
(*Concluded on page* 126)

JAMES V. BURRELL
. . . Electric Furnace sales

JACK H. EISAMAN
. . . Speer Carbon sales

WILLIAM J. HEALY
. . . De Laval sales mgr.

"I'm the shop superintendent. My job is getting good work out fast at less cost. That's why I replaced our old abrasive with Malleabrasive—and Malleabrasive does the job! It cleans perfectly—leaves a gleaming finish. Our output is increased because, not only does Malleabrasive clean faster, but we now have less down-time. And costs are down because we have fewer parts replacements, less maintenance. Also Malleabrasive lasts longer, which means fewer abrasive purchases. There's no question—we're all sold on Malleabrasive."

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(other patents pending)

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Pangborn BLAST CLEANS CHEAPER with the right equipment for every job

J. P. HOLT
. . . *Basic Refractories sales*

A. W. PLIER
. . . *D. J. Murray Mfg. Co. head*

CHARLES R. VAN RIPER
. . . *Chicago sales, Norton*

T. E. DONOHUE
. . . *Cleco Tool sales mgr.*

(*Concluded from page* 124)

in New England in 1928. Ten years later he transferred to the sales staff of the De Laval plant and in 1950 became head of turbine sales.

♦ ♦ ♦

J. P. Holt has been named to head the new sales office recently opened in St. Louis by Basic Refractories Inc., Cleveland. Before joining the company in 1950 he was associated with Midvale Co., Nicetown, Pa. He received science and master's degrees in engineering from University of Pennsylvania.

♦ ♦ ♦

Lloyd A. Mapes has joined North American Smelting Co., Wilmington, Del., following two years as head of the Casting Section, Aluminum and Magnesium Division, National Production Authority, Washington. Mr. Mapes was graduated from University of Wisconsin and has been associated with the aluminum industry since 1938. Previous connections include Reynolds Metals Co., Louisville, manager of property accounts for St. Louis Ordnance Depot during World War II, while on leave from Aluminum Goods Mfg. Co., Manitowoc, Wis., and Aluminum Co. of America.

♦ ♦ ♦

A. W. Plier, since 1950 executive vice president-general manager, D. J. Murray Mfg. Co., Wausau, Wis., has been named president-general manager, succeeding **F. C. Boyce,** who has been president 20 years and has become chairman of the board. Mr. Plier joined the production department of the company in 1930, became secretary in 1944 and director in 1948.

♦ ♦ ♦

William B. Crump has been named sales engineer in charge of the Detroit office, May-Fran Engineering Inc., Cleveland, where he will handle the company's line of materials handling and mechanized scrap handling equipment. Mr. Crump attended Lawrence Institute of Technology and was engaged in tool work and production engineering with Ford Motor Co. and General Motors Corp. until service in World War II. Since then he has been a sales engineer in tools and materials handling.

♦ ♦ ♦

Charles R. Van Riper has been appointed Chicago district sales engineer, Norton Co., Worcester, Mass. Mr. Van Riper was graduated from Stevens Institute of Technology and joined Norton Co. in 1929. Since 1941 he has been in the research and development department, recently as a field service engineer.

♦ ♦ ♦

T. E. Donohue has been named sales manager, Cleco Pneumatic Tool Division, Reed Roller Bit Co., Houston, Tex., succeeding **W. J. Vossbrinck,** who has resigned to form his own company. Mr. Donohue joined Cleco in 1948 as assistant sales manager after 22 years in air tool sales promotion work.

♦ ♦ ♦

Dr. R. Genders, deputy director of metallurgical research at the Royal Ordnance Factory, Woolwich, England, which deals with metallurgical problems of Britain's Army, Navy and Air Force, has been appointed metallurgical consultant to Vanadium Corp. of America, New York.

♦ ♦ ♦

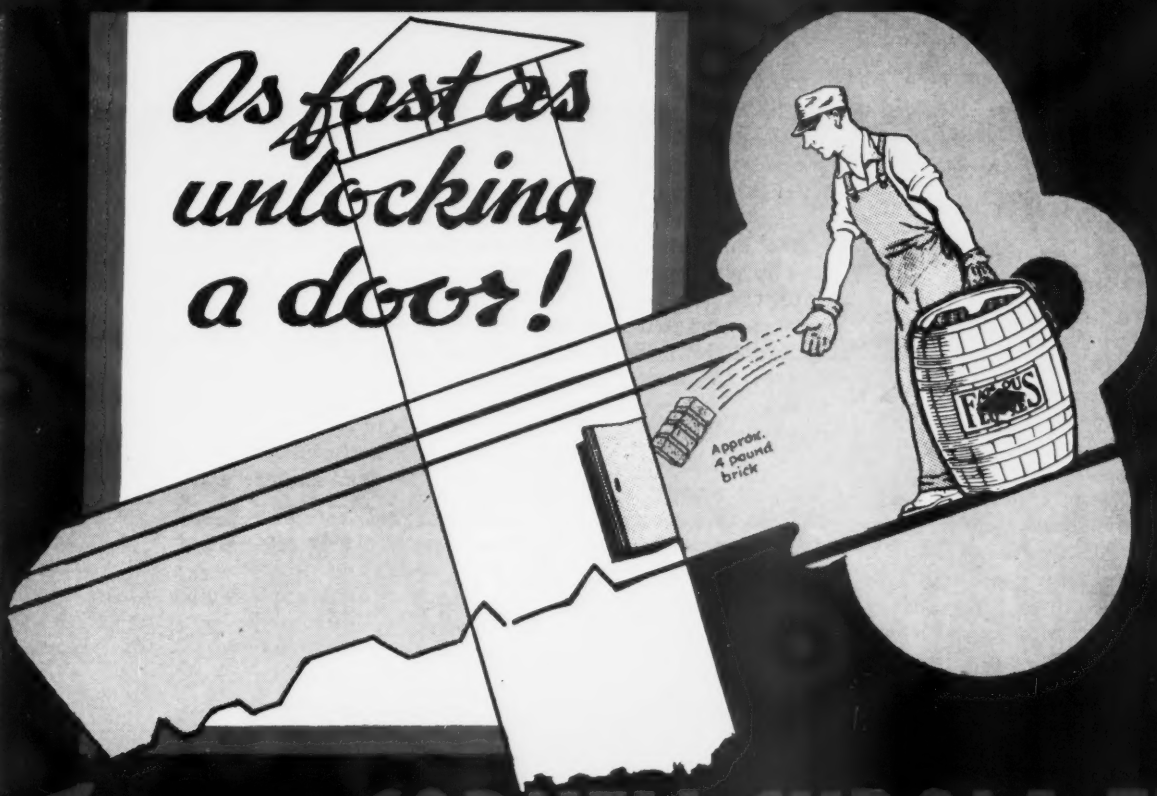
Samuel A. Crabtree, Chicago district sales manager, Republic Steel Co., Cleveland, has been named deputy director, Iron and Steel Division, NPA, Washington, succeeding **William J. Stephens,** who has been appointed director of the division.

♦ ♦ ♦

Dr. Edwin F. Pike has been appointed director of chemical engineering in the Detroit, New York, Chicago, Houston, Tex., and Windsor, Ont., offices of Giffels & Vallet Inc. L. Rossetti, engineers and architects.

LLOYD A. MAPES
. . . *joins N. American Smelting*

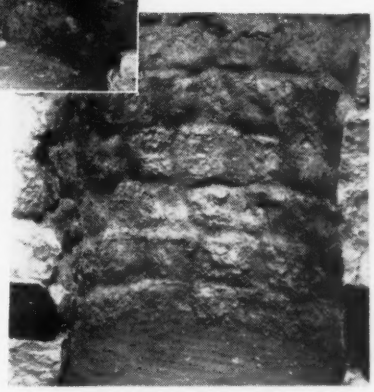
WILLIAM B. CRUMP
. . . *joins May-Fran Engineering*



Famous CORNELL CUPOLA FLUX

TAKES BUT SECONDS TO USE, AND YOU GET CLEAN IRON -- BETTER CASTINGS

THE CUPOLA before using Famous Cornell Cupola Flux



THE CUPOLA during use of Famous Cornell Cupola Flux

Outstanding gray iron foundries and malleable foundries with cupolas know from experience that iron cleansed with Famous Cornell Cupola Flux is *completely rid of foreign matter* which is the chief cause of many casting rejects and delays in shipments.

Famous Cornell Cupola Flux also contributes to sounder castings by making iron hotter and more fluid, and greatly reduces sulphur. Machining operations are much easier and smoother.

KEEPS CUPOLAS CLEANER, TOO, greatly reducing down time and maintenance. Drops are cleaner and bridging over is practically eliminated. Life of cupola lining is prolonged, due to a glazed or vitrified surface which is formed on brick or stone.

PRE-MEASURED SCORED BRICK FORM makes labor in fluxing each charge of iron practically nil, enables you to do the job accurately and without waste.

WRITE FOR BULLETIN NO. 46-B

The Cleveland Flux Co.

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Manufacturers of Iron, Semi-Steel, Malleable, Brass, Bronze, Aluminum and Ladle Fluxes - Since 1918

FAMOUS CORNELL FLUXES
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BRASS FLUX

FAMOUS CORNELL BRASS FLUX cleanses molten brass even when the dirtiest brass turnings or sweepings are used. You pour clean, strong castings which withstand high pressure tests and take a beautiful finish. The use of this flux saves considerable tin and other metals, and keeps crucible and furnace linings cleaner, adds to lining life and reduces maintenance.

ALUMINUM FLUX

FAMOUS CORNELL ALUMINUM FLUX cleanses molten aluminum so that you pour clean, tough castings. No spongy or porous spots even when more scrap is used. Thinner yet stronger sections can be poured. Castings take a higher polish. Exclusive formula reduces obnoxious gases, improves working conditions. Dross contains no metal after this flux is used.

AFS Convention Reports

(*Continued from page* 99)

be supplied to the unit in a continuous, uniform flow. His experience showed a total cost of reclaimed sand to be $2 per ton. An indirect benefit was the practical necessity of putting the foundry on a one sand basis which resulted in a simplified overall operation.

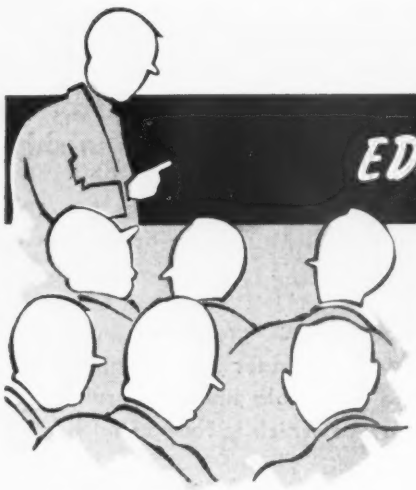
Reclaimed sand is used for both molds and cores, and workers prefer it because it works easy, having good flowability. Permeability is good, and baked strength is higher than that obtained with new sand. It also has been mixed with new sand additions satisfactorily. Experience has shown that reclaimed sand lends itself to good control, and it can be run at lower moisture content than new sand.

During discussion it was pointed out that all sand is taken for reclamation directly from shakeout over a magnetic pulley. Maintenance cost of the reclaiming unit was stated as 25 per cent of total cost of operation.

Concluding paper, **Sand Reclamation with the Combination System,** was given by G. H. Curtis, Nichols Engineering & Research Corp., New York. He stated that combination systems involve wet washing to remove clay, fines and loose matter from the sand, and heating in an oxidizing atmosphere to burn out organic or carbonaceous matter. In the burning operation the sand is fed into the top of a multiple hearth furnace operated at 1200-1400°F and agitated slowly so that it falls from hearth to hearth, coming out the bottom in ready-to-use condition after cooling.

Claimed advantages for the combination system are that it provides a reclaimed sand equal in characteristics to new sand in that there is no partial adherence of carbonaceous or other matter to sand grains, good control over subsequent sand mixes and increased tensile strength of cores per given amount of core oil as compared with unburned sands. Additionally, the cost of reclamation as based on a steel foundry experience which has been handling 7000 tons of sand per month is $1.39 per ton, including fixed charges.

Discussion brought forth the comment that thermal reclamation alone cannot be used for clay sands, and that the burning operation does not affect the durability (thermal shock) of either round or angular sand.



THREE sessions, including a dinner meeting, were sponsored by the Educational Division, during the convention. These meetings, to a large extent, were devoted to discussion of training methods and the problem of interesting young men in joining the foundry industry.

With the Foundry Educational Foundation devoting its activities to the colleges and universities, the American Foundrymen's Society is concentrating its educational work on the trade school, high school and vocational school levels.

The opening meeting, presided over by Prof. George J. Barker, University of Wisconsin, and W. J. Hebard, Continental Foundry & Machine Co., East Chicago, Ind., was devoted to **"Job Training in the Foundry".**

Speakers were E. R. Andrews, Hyde Windlass Co., Bath, Me., and T. Miller, Great Lakes Founders & Machine Corp., Ludington, Mich. While the training methods employed in these two foundries differ, it was the consensus in subsequent discussion that the effectiveness of any plan depends to a large extent upon the ability and initiative of the individual responsible for carrying it out.

The plan employed at Mr. Andrews' company consists of a four-year training comprising 8000 hours. It is based on a course furnished by the International Correspondence School but adapted to the company's needs. In addition to shop training, it includes study of related subjects such as pattern work, electricity, mathematics and blueprint reading. Foremen take certain parts of the course along with the apprentices in order to anticipate and answer questions of the trainees.

Mr. Andrews said that graduates of this apprentice course form the nucleus for the company's supervisory jobs in the future. For any training program he recommended careful selection of individual apprentices, careful work in planning schedules to suit the individual shop, and the use of related training work.

Mr. Miller said that his company, which was established in 1945 in an area where no trained foundry workers were available, uses a method of breaking down each job to develop particular skills in the individual. As a result, it was possible to train men relatively quickly in specialized work such as charging, melting, cupola relining, molding, etc.

New workers start in the shakeout department and are up-graded according to seniority and ability. When advanced to the molding department, the man starts as a stack helper, then to the utility casting floor, and eventually to the squeezer molding line. He said it requires three to four months in the molding department to qualify a man for regular squeezer molding. A similar plan is followed in coremaking, the cleaning room, heat treating and melting departments.

The company places emphasis on advising workers regarding company policies, regular group meetings being held for this purpose.

The Foundry Industry and Formal Education was the discussion subject at the second session. This was presided over by Earl M. Strick, Erie Malleable Iron Co., Erie, Pa., and Roy W. Schroeder, University of Illinois, Chicago.

B. D. Claffey, president, Acme Aluminum Alloys Inc., Dayton, O., pointed out that high school students frequently are not counseled adequately regarding the opportunities offered by various industries. He urged that the foundries contact individual schools and attempt to interest students in foundry work as a career. He pointed out that this must be done at the local level by the chapters, rather than by the national association. In addition, it frequently is helpful if the type of curriculum can be installed in a school which will assist students in preparing them for foundry work.

Mr. Claffey said that the manual arts and sciences should be given

(*Continued on page* 130)

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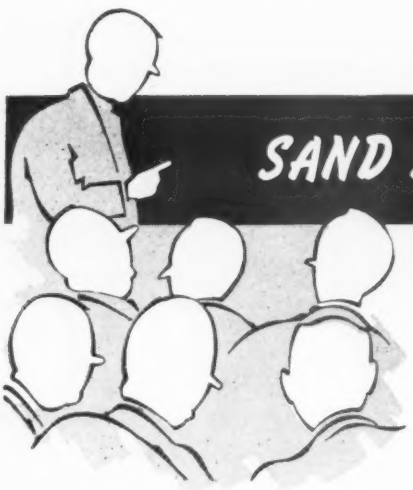
(*Continued from page* 128)
the dignity they deserve. In this way, both the quality of the trainee and that of the future employee will be improved.

Speaking on the same subject, Fred G. Sefing, International Nickel Co., New York, said that industry must start by selling itself to the schools. He emphasized that the teachers must be made acquainted with foundry opportunities, before the students can be approached. He recommended that foundries invite school officials to visit their plants. Talks before student groups also should be planned.

In subsequent discussion it was pointed out by C. C. Sigerfoos, Michigan State College, that one of the principal drawbacks in training students in foundry subjects in vocational schools is the difficulty in obtaining competent teachers.

Collins L. Carter, AFS vice president and president, Albion Malleable Iron Co., Albion, Mich., presided at the Educational Division dinner. A highly inspirational talk was given by Harry E. Gravlin Jr., Ford Motor Co., Dearborn, Mich., who spoke on chapter educational activities.

While Mr. Gravlin's talk outlined some of the work in this field done by the Detroit Chapter, his excellent discussion of some of the opportunities offered by the foundry industry proved equally interesting. The Detroit chapter has a well organized educational committee, and has worked with science clubs in that city; has sponsored participation among students in regional conferences; has circulated an educational strip film developed by the Northwestern Pennsylvania Chapter, and has promoted newspaper publicity regarding activities of foundries.



SAND SHOP COURSE

THREE sand shop course meetings covered the broad subjects of pinhole porosity, evaluation of molding methods, and relationship of hot properties of molding sand to casting defects in steel and malleable iron.

First session considered pinhole porosity. A panel of three speakers discussed the subject as it applies to brass and bronze, aluminum and malleable iron. F. S. Brewster, Harry W. Dietert Co., Detroit, was chairman and K. L. Landgrebe, Wheland Co., Chattanooga, was co-chairman.

G. R. Gardner, Aluminum Co. of America, Cleveland, opened the discussion by stating that chief causes for porosity in aluminum castings are dissolved hydrogen, cooling rate and alloy composition. Rounded voids occur in alloys having a narrow solidification range while angular voids are formed in alloys having a wide solidification range. Ideal conditions for eliminating pinholes in aluminum castings are low gas content coupled with rapid cooling.

William George, R. Lavin & Sons, Chicago, chose for his subject methods to eliminate pinholes from chromium plated plumbing goods. He first recommended superheating the metal to 2250° F and cooling it back to 2175 or 2150° F before pouring. He stated that hydrogen is the greatest enemy. Rate of pour and shape of sprue also are important as well as choking the metal as it enters the mold. He stressed the need for accurate fitting of cores to prevent shifts or crushes. A startling recommendation was to add both phosphor copper and copper oxide at the same time when degasifying the metal.

Concluding speaker was L. E. Emery, Marion Malleable Iron Works, Marion, Ind., who recounted his experiences in controlling a wide variety of variables in malleable casting production in order to determine the causes for pinholes. Experience indicated that the size of the gate influenced their occurrence, and by enlarging the gate, pinholes were cut down. Alloy additions in the ladle are difficult to handle and are a contributing factor.

Hiram Brown, Solar Aircraft Co., Des Moines, Iowa, presided at the second sand shop course, assisted by R. H. Olmstead, Whitehead Bros. Co., Conneaut, O. The meeting was devoted to **Evaluation of Molding Processes.** Each process was discussed briefly and the panel of speakers then answered questions from the audience.

Processes and speakers discussing them were: Green sand molding, C. E. Maddick, Massey-Harris Ltd., Brantford, Ont.; permanent mold and die casting, W. B. Scott, American Brake Shoe Co., Meadville, Pa.; dry sand molding, G. G. Anselman, Beloit Foundry Co., South Beloit, Ill.; shell molding, J. B. Stazinski, General Electric Co., Lynn, Mass.; core sand molding, G. P. Antonic, Motor Castings Co., Milwaukee.

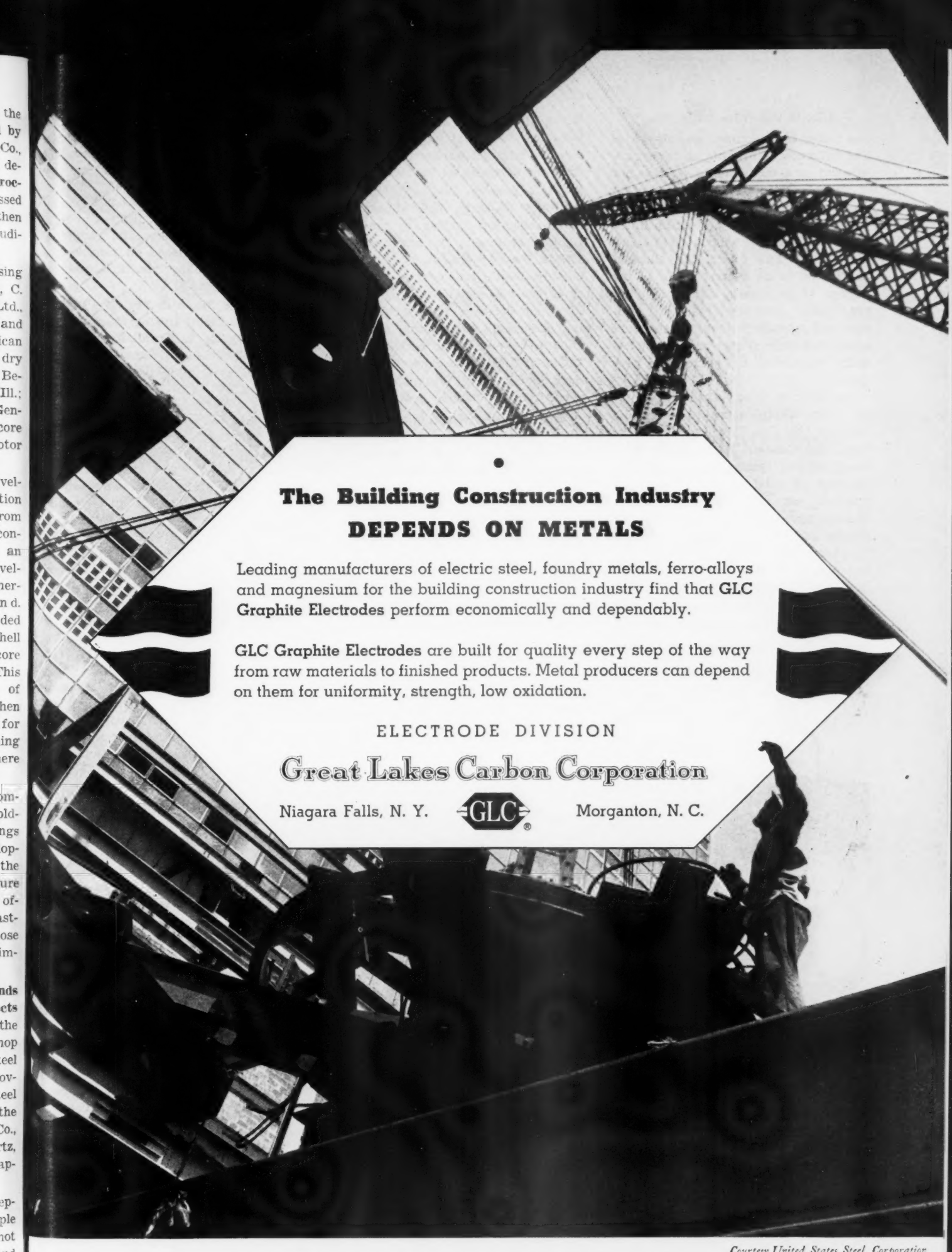
Discussion of shell molding developments brought a brief explanation of the so-called D-Process from Harry W. Dietert, Detroit, who conceived the contoured shell drier, an integral part of the process developed in conjunction with the Archer-Daniels-Midland Co., Cleveland. Liquid binder and sand are blended in a conventional mixer and a shell mold is formed by a standard core blower onto a contoured drier. This drier is used to form the back of the shell mold and to support it when the shell is placed in a core oven for curing. Additional details concerning the process are presented elsewhere in this issue.

Mr. Antonic was asked to comment on the new high-pressure molding process on which Motor Castings Co. has done considerable development work. He explained that the practice, involving squeeze pressure of several hundred psi, seems to offer much promise in producing castings of superior surface finish, close dimensional tolerances, and in eliminating need for risers.

Hot Properties of Molding Sands and Their Relation to Casting Defects was the discussion subject at the third and concluding sand shop course. H. W. Meyer, General Steel Castings Corp., Granite City, Ill., covered the subject from the steel foundry viewpoint. Presiding at the session were R. H. Jacoby, Key Co., East St. Louis, Ill., and F. E. Kurtz, Electric Steel Castings Co., Indianapolis.

Stating that he believed in keeping foundry sand practice as simple as possible, Mr. Meyer described hot strength, expansion-contraction and thermal shock elevated temperature tests for steel molding sands. After

(*Continued on page* 132)



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(*Continued from page* 130)

the tester has acquired knowledge of the influence of organic and inorganic sand mix components on the hot strength and expansion-contraction characteristics of a sand, these two tests can, in part, be discontinued and the thermal shock test used alone. He has found the thermal shock test to be a good guide to the degree of burned-on sand or metal penetration, veining, scabbing, erosion and sand inclusions. Tests were conducted with a dilatometer and results correlated with castings produced.

He went on to say that uniformity of room temperature test results conveys the idea that each batch of sand is the same. However, elevated temperature testing shows that batches of sand of the same composition are not completely alike. Furthermore, investigations should not be confined to laboratory testing. Consideration must be given to casting design, size, metal section thickness, gating and kind of metal cast. Foundry facilities, core and molding practices also are influential factors.

During the discussion period the speaker suggested that sand mixes be kept as simple as possible; they are easier to control. He also believes that mixes should be formulated in such a manner that they can be rammed as hard as possible with no detrimental results.

B. C. Yearley, National Malleable & Steel Castings Co., Cicero, Ill., discussed sand testing in malleable foundry practice. The basic problem, as Mr. Yearley sees it, is to produce castings with no defects. Testing, therefore, should be based on that approach. Room temperature testing provides a satisfactory guide, although he pointed to certain advantages of the sand block test developed by the Steel Founders' Society for high-temperature testing.

With the use of a number of slides he showed results of a program of test work. One sand which had been doubled in hot strength, produced castings with hot tears. Another sand, which showed no hot strength above 1500°F, produced cores which cracked castings.

After outlining various formulations for achieving specific desirable characteristics, the speaker showed how other characteristics are affected adversely. The conclusion, then, is that sand formulations must of necessity be a compromise of desirable characteristics, depending upon the size and type of casting.

STEEL CASTINGS

IN THREE sessions and one roundtable luncheon steel foundrymen dealt with a wide array of topics, including hot tears, influence of mold materials, progress in fluidity testing, feeding range, riser behavior, brittle fracture and centrifugal casting.

A well attended roundtable luncheon meeting began the proceedings, and had as chairmen J. B. Caine, Cincinnati, and V. E. Zang, Unitcast Corp., Toledo, O.

C. H. Wyman, Burnside Steel Foundry Co., Chicago, presented a progress report of the AFS Steel Research Committee on investigation of hot tears in which it was pointed out that the group now has six foundries co-operating in obtaining data on use of the hot tear test previously developed at Armour Research Foundation. Early tests indicated that pouring temperature and rate affect the results obtained so the committee now is developing a suitable pouring basin to provide uniform pouring rate.

First technical session, with C. B. Jenni, General Steel Castings Co., Eddystone, Pa., and J. R. Goldsmith, Crane Co., Chicago, presiding, was concerned with influence of molding materials on hot tears and progress in fluidity testing.

Influence of Molding Materials on the Incidence of Hot Tearing, by J. M. Middleton, British Steel Castings Research Association, Sheffield, England, was presented in the author's absence by C. W. Briggs, Steel Founders' Society of America, Cleveland. The author found that as density of green or dry sand increases, there is an increase in likelihood of hot tearing, for similar densities dry sands resist contraction of the casting more than green sand. Most severe tearing was encountered in tests with organic binders, and reduction in amount of linseed oil renders the sand more collapsible, and reduces extent of tearing.

Progress Made in Fluidity Testing of Molten Metal During the Last Ten Years, by A. I. Krynitsky (retired) National Bureau of Standards, Washington, was presented by J. H. Schaum, also with the bureau. The author described the various methods developed during the past decade, and observed that the preferred one appears to be the spiral type having cross sections of a trapezoidal shape with areas from 1/12 to 1/7 sq in. Pouring basins with an overflow should be provided for uniform pouring, and the temperature controlled. Length of spiral is taken at the last point where the channel is filled completely.

Two papers were presented at the second session, presided over by A. H. Suckow, Symington-Gould Corp., Depew, N. Y., and K. Fritz, Bucyrus-Erie Co., Milwaukee. **Feeding Range of Joined Sections,** by E. T. Myskowski, co-author with H. F. Bishop and W. S. Pellini, all of Naval Research Laboratory, Washington, comprised a study of cast steel plate sections of various thicknesses and lengths to determine the distances which could be fed to soundness.

It was found that the effect of joined dissimilar sections is, in most cases, one of reducing feeding distance in the larger section and increasing feeding distance in the small section beyond that obtainable in the same sections when cast separately. However, very large or very small thickness differences cause these respective effects to be reversed.

Fundamentals of Riser Behavior, by C. M. Adams and H. F. Taylor, Massachusetts Institute of Technology, was presented by Mr. Adams. It represented a study of heat and quantitative requirements existing in a riser system, and resulted in development of the following relationship between the casting's and riser's volumes and area:

$(1 - \beta)\ V_r/V_c = A_r/A_c + \beta$,

where β represents per cent shrinkage divided by 100.

While contour and superheat effect can be disregarded, a correction factor is needed for chills. This correction is based on the fact that conductivity of 1 sq in. of chill is equivalent to that of 2.2 sq in. of sand.

(*Continued on page* 134)

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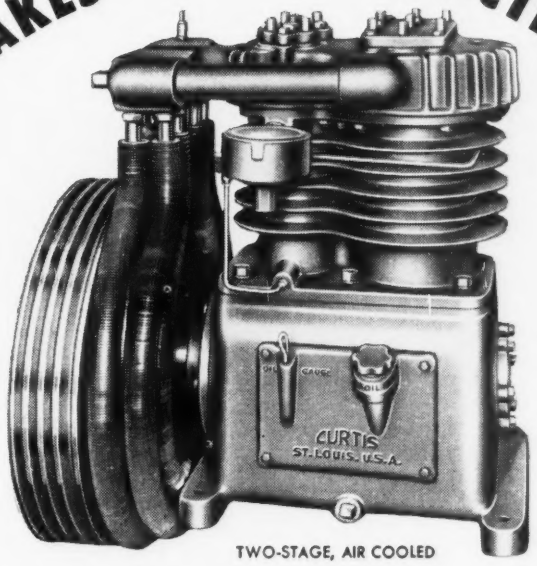

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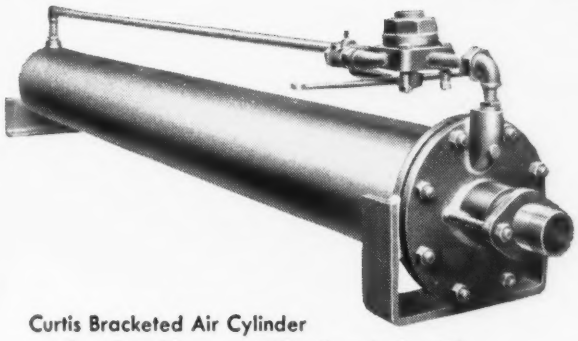

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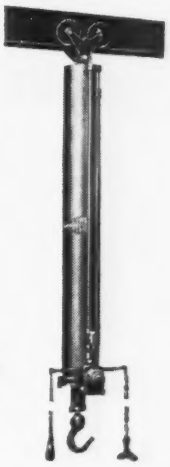

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(*Continued from page* 132)

The concluding steel session had A. W. Demmler, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., and J. Neff, American Steel Foundries, E. Chicago, Ind., as chairmen.

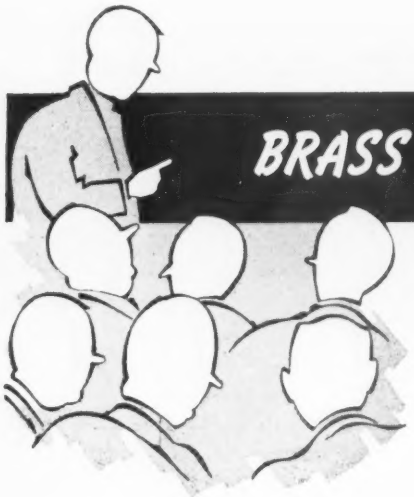
Performance of Cast and Rolled Steels in Relation to the Problem of Brittle Fracture, by W. S. Pellini, F. A. Brandt and E. E. Layne, Naval Research Laboratory, was presented by Mr. Pellini. The paper points out that the old conception that cast steels are inherently brittle compared with rolled steels was changed with the advent of welding fabrication.

Failure of welded bridges, pressure vessels and ships led to the realization that brittle fracture resulted from a combination of (1) the presence of sharp cracks induced by welding and (2) the rigidity and continuity of the all-welded structure. Consequently, the relatively unfavorable showing of cast steel appears due, at least in part, to structural differences rather than to differences in the inherent resistance to brittle cracking.

The authors' test demonstrated that conventional notch toughness properties of cast and rolled steels are similar; also that the resistance to brittle fracture is exactly the same. Thus, Charpy V data may be used for design purposes without distinction as to types.

Engineering Aspects of Centrifugal Casting, by J. F. Wallace, Watertown Arsenal, Watertown, Mass., was the concluding paper. It discussed the general applications of the true centrifugal, semi-centrifugal and centrifuging casting operations. Centrifugal casting is limited principally to cylindrical objects, and its application in production of pipe and gun tubes in metal molds was described. High yield, uni-directional solidification and good casting surface characterize the practice. Use of sand molds is more intricate but eliminates annealing required with metal molds.

Semi-centrifugal casting is used to make such products as wheels and gear blanks in a complete mold revolved on a vertical axis, and the metal is introduced through the hub. Rotational speed is slower than in true centrifugal casting. Centrifuging employs a mold with a central down-gate. Metal is carried through radial sprues to mold cavities grouped about the down-gate. It is used primarily for small castings, sometimes in precision investment work.



BRASS SHOP COURSE

"FURNACE Operation and Practice" was the subject at the two Brass and Bronze Shop Courses, both of which were presided over by R. J. Keeley, Ajax Metal Division, H. Kramer & Co., Philadelphia, and by H. M. St. John, Crane Co., Chicago.

B. W. Schafer, Detroit Electric Furnace Division, Kuhlman Electric Co., Bay City, Mich., presented the first paper, **Indirect Arc and Resistance Furnaces.** Tracing the development of rocking type furnaces, Mr. Schafer noted that indirect arc furnaces had to be rocked to prevent metal loss when the zinc content of the melt exceeds 20 per cent and that the first rocking furnace was built during World War I.

He stated that lining life should be reckoned in terms of kwh per ton and that lining cost should come to about $1 per ton. Labor cost should run about $7 per ton with single furnace operation. Metal loss during single furnace operation with 85-5-5-5 alloy should be ½ of 1 per cent. Depreciation over 15 years should be about $1.50 per ton.

Resistance type furnaces, in use since about 1930, are generally less efficient than arc furnaces, with an operating cost per ton of $19 or $20, but melting losses are lower. Also, the lower temperature at which they operate should yield longer life.

The second speaker, F. T. Chestnut, Ajax Electrothermic Corp., Ajax Park, N. J., discussed **Low and High Frequency Induction Furnaces.** Mr. Chestnut pointed out that in induction furnaces, the power that melts metal also stirs it. Heat is generated in melting, and the lack of heat loss aids working conditions. He asserted that induction furnaces are better suited for long runs of constant metal than for short runs of "fussy" metals. High-frequency furnaces, available up to 5-ton capacity, should be used to melt odd lots of special brasses and are preferable where analyses are changed frequently. The smaller a melt is, the higher the frequency that is needed.

Coal and Coke Fired Furnaces, a paper by R. H. Stone, Vesuvius Crucible Co., Swissvale, Pittsburgh, was to a considerable extent historical in nature. Mr. Stone said that solid fuel-fired furnaces now occupy a minor position in the industry. Perhaps 250 foundries still use them, whereas at one time a majority did. Most existing units use coke, from which forced draft gets more Btu than natural draft.

At the second shop course session, J. C. Smith, Stroman Furnace & Engineering Co., Franklin Park, Ill., read a paper by J. L. Stroman, of the same company, entitled **Gas and Oil Fired Furnaces.** Mr. Stroman's paper pointed out that a straight stack gives good ventilation and that special ventilators are of no benefit. Furnaces should be placed against walls. The roof of the furnace room should be of fireproof materials.

Deciding whether to use gas or oil, foundrymen should compare the two fuels locally on a thermal content basis. Gas users need standby oil. Either 2 gal of oil or 2500 cu ft of gas should be consumed per 100 lb of red brass.

The paper warned against using brass furnaces for holding rather than for melting—particularly the tilting type furnaces. Such use is uneconomical. A good man should be given the job of tending the furnace, and the ideal situation is to have metal on tap whenever it is needed, but not to have to hold it.

M. G. Dietl, Schaible Foundry & Brass Co., Cincinnati, presented **Furnace Practices,** the other paper at this session. He limited his discussion to 275-lb gas-fired crucibles. Assuming the proper burner, he said, lining is vital, and long lining life is built by proper installation. He recommended rammed-up lining, applied in very thin layers. The burner port either should not be rammed, or it should be chipped out, a mandrel inserted and the lining rammed tightly around it. The port should be so rammed that the flame functions properly, swirling around the cru-

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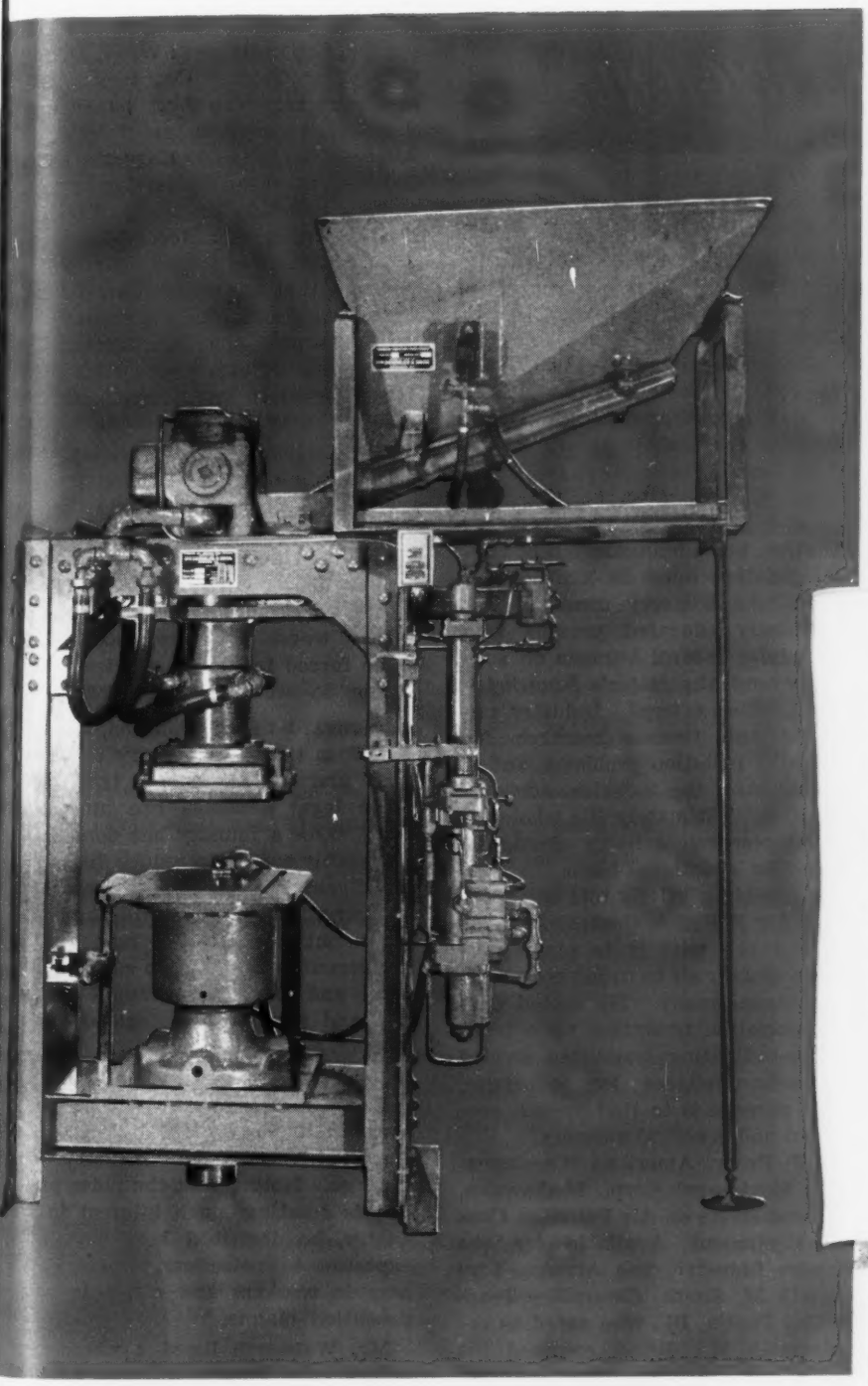
when fire protection was a pair of white horses



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Write for Literature

(*Continued from page* 134)
cible about 2½ times.

First heat should take about 1½ hr, and 100-lb heats after the fourth should take about 55 min. Furnace melt records should be kept on each furnace. Flame should be adjusted as the lining slags off. With reasonable care, a crucible should have a life of 80 heats, and as many as 160 are possible under proper conditions.

Mr. Dietl warned that reverberatory furnaces are meant only for fast melting, not for holding. When they are used to hold, oxidizing takes place. He also warned about keeping metal dry. If moisture doesn't cause an explosion, he cautioned, it will provide hydrogen that will be absorbed and will cause porosity.

SAFETY and HYGIENE

FOUR sessions were offered by the Safety, Hygiene & Air Pollution Committee. At the opening session Chairman F. A. Patty, General Motors Corp., Detroit, presented J. M. Kane, American Air Filter Co., Louisville, whose subject was **What Are Future Air Pollution Prospects for the Foundry Industry?**

According to the Foundry Equipment Manufacturers Association, close to 10 per cent of all capital expenditures for foundry equipment in 1948-1952 was allocated to air pollution control equipment. Mr. Kane showed figures on pollution control in a typical foundry, citing approximate equipment cost of dust collection per operation—shakeout, sand system, blast room, etc. Looking into the future, he said foundries with efficient arresters controlling grinding operations have little to worry about concerning more stringent controls.

The industry must make a more determined effort to counteract present trends of control authorities to view visible fume from melting furnace stacks as a major contributor to community air pollution problems, Mr. Kane stated. If the foundry industry emphasized to community or control groups that it has installed extensive and effective air pollution control appliances much public criticism might be forestalled which is based on lack of information.

R. T. Greibling, Air Pollution Control Association, Pittsburgh, in his subject, **Know Your Problem for Your Community,** divided his material into two sections. A general description of present-day air pollution control problems as they affect industry and the public was given first. He cited what New York, Chicago, Detroit, Cleveland and other cities are doing to find out more about the air pollution problem. The speaker feels that political leaders must be urged to offer and pass air pollution control legislation, but administration of control legislation must be kept out of politics. An advisory committee of scientifically educated persons who could advise control bureaus on subjects beyond the latter's knowledge is one solution offered. Industry can institute and finance research for solution of pollution problems, and it can help staff the technical advisory committee. Ultimately the whole industrial research activity should be pursued on a national basis.

Mr. Greibling briefly told the story of the Air Pollution Control Association and the part it is playing to bring a cleaner air to urban communities internationally. He stated that the association is setting up a technical co-ordinating committee, divided into subcommittees by industries, whose purpose is to find proper, economical and practical answers.

R. T. Pring, American Wheelabrator & Equipment Corp., Mishawaka, Ind., who spoke on **Air Pollution Control Equipment Available for the Foundry Industry,** was introduced by Kenneth M. Smith, Caterpiller Tractor Co., Peoria, Ill., who acted as co-chairman. Mr. Pring confined his discussion to melting operations. He first defined atmospheric pollution and explained atmospheric pollution codes, pointing out that the codes vary in some localities. Los Angeles, topographically and meteorologically, requires codes different from cities in flat top areas like the middle West—and codes require study. Restrictions must be placed but a code to be fair and equitable must recognize that control requirements in one area may bear no resemblance to what is reasonable elsewhere.

Other phases of the subject discussed by Mr. Pring included nature of solids in furnace stack gases and equipment for controlling discharges from various types of melting units.

The second safety, hygiene and air pollution session was presided over by J. G. Liskow, American Air Filter Co., Louisville, with W. W. Dodge, Caterpillar Tractor Co., Peoria, Ill., as chairman. The first paper consisted of a progress report by J. R. Allan, International Harvester Co., Chicago, on the AFS safety, hygiene and air pollution program. Praising the personnel and accomplishments of the code committee, Mr. Allan reported that the committee did not have many concrete suggestions to make because the investigation of causes and effects came first. He called for more contributions to the fund to carry on the program.

Mr. Allen said that although the AFS training course in foundry safety now is well organized and the industry has been advancing its safety program, labor and government groups may force more improvements. Small foundries were named as the worst offenders, most likely to be forced to reduce accident rates if they do not do so voluntarily.

In regard to air pollution, he said that it is time for industry to assert itself and call for proper treatment. Some legal demands are unreasonable. Once a foundry has done all it reasonably can do to reduce discharge of effluents, no more should be asked. Industry, he stated, will have to move out of cities if homeowners are permitted to build up surrounding areas and then get through restrictive and unreasonable legislation involving air pollution.

Noise in the Foundry was the subject of the second paper at this session, presented by H. T. Walworth, Lumbermen's Mutual Casualty Co., Chicago. Noting that the noise problem is creating much interest in industry, he described how too much exposure to noise can create deafness in workers and result in compensation claims.

Mr. Walworth listed a number of points that should be considered in relation to the noise problem. The first of these is the evaluation of permissible noise levels. Others include the proper use of audiometers

(*Continued on page* 138)

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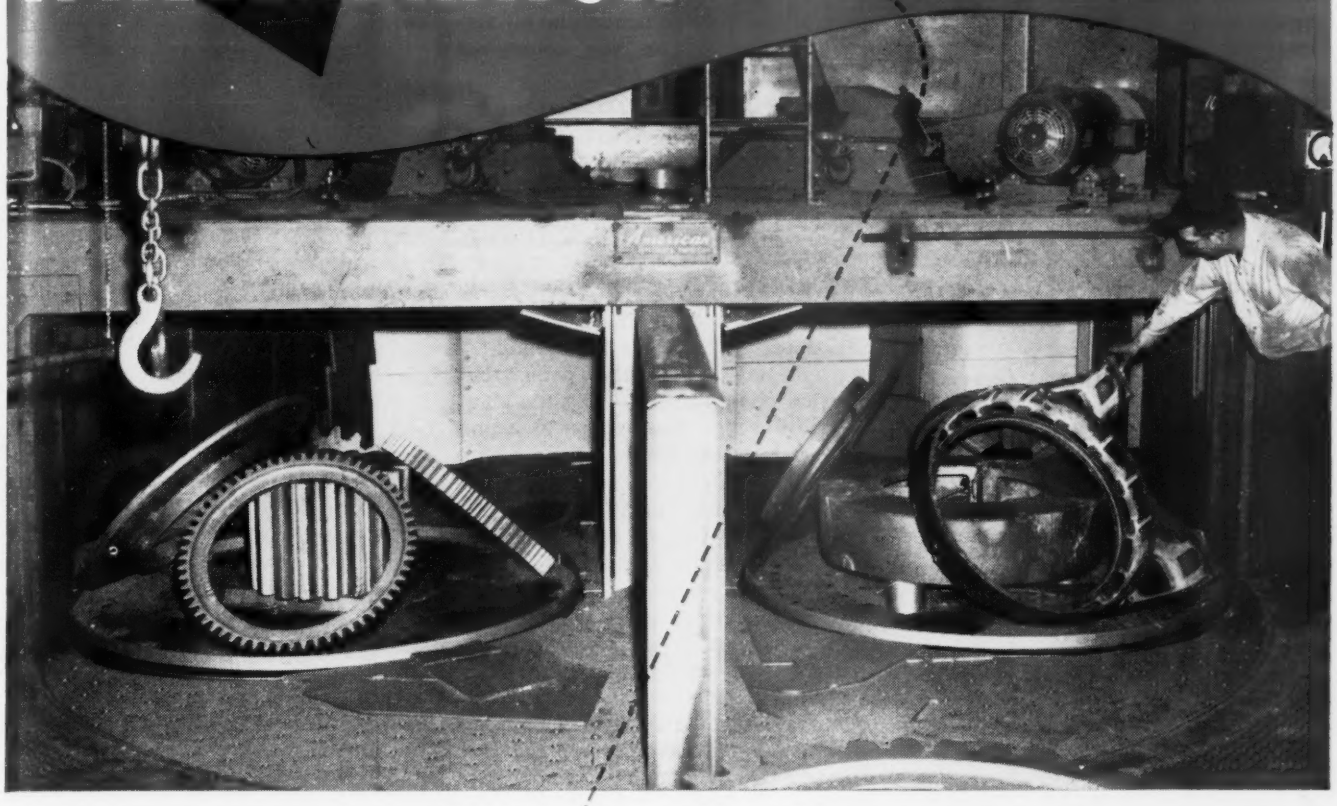

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(*Continued from page* 136)

and the setting up of a good procedure for measuring percentage of hearing loss; design and construction at reasonable cost of proper rooms for audiometrical operations; organization of practical medical programs for noisy industries; means of determining between temporary and permanent hearing loss; and equipment to measure impact (irregular) noises.

Dust Control—Past, Present and Future was discussed at the third session by a panel comprised of K. J. Caplan, a ventilation consultant, St. Louis, K. M. Smith, Caterpillar Tractor Co., Peoria, Ill., and A. G. Granath, National Engineering Co., Chicago. J. G. Liskow, American Air Filter Co., Louisville, Ky., and W. W. Dodge, Caterpillar Tractor Co., Peoria, served as presiding chairmen.

Mr. Caplan believes management, labor and the general public have experienced a change in their previous arbitrary attitudes with regard to dust and fume hazards as reflected buildings are now designed to provide adequate ventilation instead of providing for it later as an awkward afterthought. Some old code requirements proved to be a hindrance to proper dust collection. Industry has awakened to the need of correcting dust and fume hazards as reflected through the activity of such groups as the American Society of Heating and Ventilating Engineers, the American Society of Mechanical Engineers, American Society of Chemical Engineers, the American Standards Association in addition to the AFS in seeking and assembling more information on the subject of ventilation.

Published information includes a manual now being revised by the AFS; a manual by the American Conference of Governmental Hygienists and a code, "Fundamentals of Exhaust Systems," in the course of preparation by the ASA.

As for the future, Mr. Caplan believes there will be fewer departures from scientific and economic facts than in the past. Also, we must recognize to what extent industry is responsible for air pollution and how much comes from other sources. In addition, the standard of cleanliness we are striving to attain should be determined. It is the hope that education will reach the point that ventilation will be solved by the plant engineer with the same ease as a piping or electrical problem is now handled.

Mr. Granath believes foundries should start to eliminate the ventilation and health hazards on the inside first. Stack fans ventilating from the roof are not satisfactory. The correct way is to catch the contaminants at the source before they have the opportunity to spread. While savings from the investment of money for ventilating equipment are intangible, they do provide better working conditions, better neighbor and employee relations and insurance against health hazards.

He said the AFS subcommittee on ventilation inside foundries has been collecting data on which contaminants are a health hazard and how to catch them at the source. The committee hopes a manual can be published giving recommendations on volume of air required for various conditions, hood construction and all data necessary to design and maintain a complete exhaust system.

Mr. Smith concluded with an analysis of equipment available for collecting cupola dust. He stated management has two choices—a medium-cost, medium-efficiency unit, or a high-cost, high-efficiency installation. He pointed out that one high-cost unit provided a return on its investment. It includes a hot blast system, thereby providing savings in coke and offering more efficient melting.

The moderate price-efficiency collectors include a circular shell fitting over the cupola stack with a water spray to knock down the dust. The system requires adequate water supply, pumps, sluiceway for the water and dust, and settling tanks. A second type is a dry dynamic collector with only enough water needed to reduce the gas temperature to protect the dust collector. With this type, consideration must be given to the disposal of the collected dry dust. Another type is the conventional wet type foundry dust collector with gas cooling water sprays in the ducts ahead of the collector.

The high-efficiency collectors are similar, one featuring glass cloth filters which can withstand temperatures up to 500° F whereas the other has orlon filters which will withstand temperatures up to 275°. These systems produce a steam cloud in cold weather so Mr. Smith urged good publicity regarding such an installation to advise the community that *clean* steam was being released.

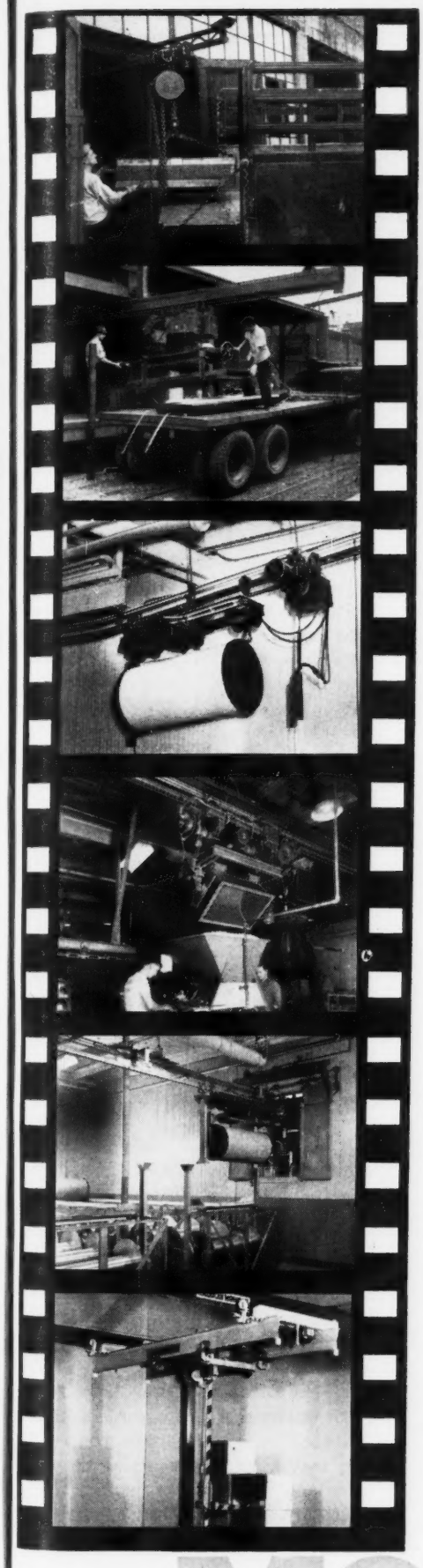
In subsequent discussion, James R. Allan pointed out that while the closed circuit type of cupola dust collector system offers advantages, it does provide safety hazards as well by building up concentrations of combustible gases within the system.

Concluding session was presided over by J. W. Young, International Harvester Co., Chicago. F. W. Shipley, Caterpillar Tractor Co., Peoria, Ill., presented the paper, **Positive Benefits of a Safety Program,** in which he stressed the belief that safety thinking must come from top management and a definite program must be planned and followed, otherwise a safe plant operation cannot exist.

The program at Caterpillar is based on detailing every accident on an IBM card and issuing monthly reports by departments. Off - shift monthly safety meetings are attended

(*Continued on page* 140)

Booth conducted by the AFS Safety, Hygiene and Air Pollution Committee where convention visitors had opportunity to discuss problems with committee members



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(*Continued from page* 138)

by all levels of supervision. A different supervisor leads each monthly meeting, at which all major and minor accidents are discussed. Also reporting at this meeting is a committee of supervisors which makes a daily plant inspection for cleanliness and orderliness.

A committee of three supervisors, who are changed each month, meets daily to discuss first-aid cases from the previous day and make recommendations to prevent recurrences. All recommendations are followed up.

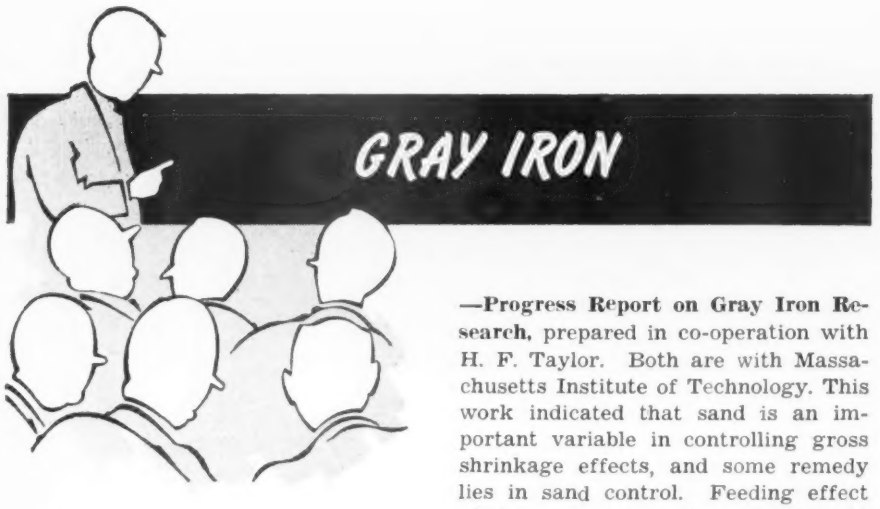
In addition to supervisor committee meetings, union safety meetings are held and the chairman of that committee meets monthly with the safety director and his staff to discuss overall plant safety problems.

Employees are encouraged to wear proper types of safety equipment. Eye protection is furnished all employees and iron pourers are furnished wool pants faced with chrome leather. Pourers are required to wear chrome leather spats or leggings over their safety shoes and underneath the pants leg. Other safety equipment is sold to employees at cost.

Another feature of the program is the instruction and licensing of all power truckers, tractor drivers, overhead crane operators, and drivers of mobile equipment. No one may operate any of the above equipment unless he is licensed.

The following discussion period was presided over by a panel of safety experts including M. F. Biancardi, Allis - Chalmers, Milwaukee; Bert Hindmarch, American Steel Foundries, Chicago; E. M. Altman, Hamilton Foundry & Machine Co., Hamilton, O., and Mr. Shipley. Proper width of aisles was suggested as being twice the width of trucks plus 4 feet for two-way truck traffic and pedestrian traffic.

It also was suggested that a screen or other protective device be placed in the cupola below the charging door and that workers wear protective hats when cupola repairs are being made.



LIVELY interest of gray iron foundrymen in furthering the progress in their field was exemplified by the scheduling of five technical sessions—more than any other metals branch, and a roundtable luncheon.

Wide diversity of phases dealt with in the various sessions is indicated by the following topics which were discussed: Risering, dephoshorization, production of machine tools, acid cupola slags, chill tests, heat treatment for stress relief and improvement of machinability or properties, hardening characteristics of nodular iron, effect of magnesium, and prediction of properties.

J. S. Vanick, International Nickel Co. Inc., New York, and C. A. Johnson, Armour Research Foundation, Chicago, presided at the first session at which W. A. Schmidt presented **Risering of Gray Iron Castings**—**Progress Report on Gray Iron Research,** prepared in co-operation with H. F. Taylor. Both are with Massachusetts Institute of Technology. This work indicated that sand is an important variable in controlling gross shrinkage effects, and some remedy lies in sand control. Feeding effect of risers may stop after only 20 to 40 per cent of the metal has solidified, due to bridging of dendrites across the feed channel. Hydrogen, oxygen and water vapor may cause normal risering practice to function erratically. The paper also described a new apparatus to determine rate of riser feed and other effects.

In the discussion C. C. Sigerfoos, Michigan State College, pointed out that the previously held idea that mold and core materials do not cause shrinks has been quite well disproved. Additional need now is a study of mold materials to supply information on how such trouble can be eliminated.

Efficient Methods of Production of Machine Tool Castings, by G. W. Nicholls, Modern Foundries Ltd., Halifax, England, comprised the official exchange paper from the Institute of British Foundrymen, and was presented by the author in person. He described in considerable detail practices employed in producing large and small machine tool castings. Development of many of the practices was the result of careful study of castings and production methods to ascertain causes of defects. From this study written standard specifications were made and distributed to supervision. These are termed process instruction sheets, and pertain to each type of casting made. The author stated that this type of study resulted in lower cost castings of better quality, coupled with reduction of waste of valuable materials and loss of machine shop hours.

Second gray iron session dealt with cupola operation and melting conditions. H. A. Deane, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., presided, and G. L. Richter, Farrel-Birmingham Co., Ansonia, Conn., was co-chairman.

First of two papers was **Dephosphorization of Iron—Basic Cupola Operation,** by J. E. Bolt, Lt., USNR, Bureau of Ships, Washington. The author prefaced the description of his investigation with a statement that except for the few but growing number of basic-lined cupolas nearly all the iron melted in foundries of the United States is melted in cupolas with acid linings.

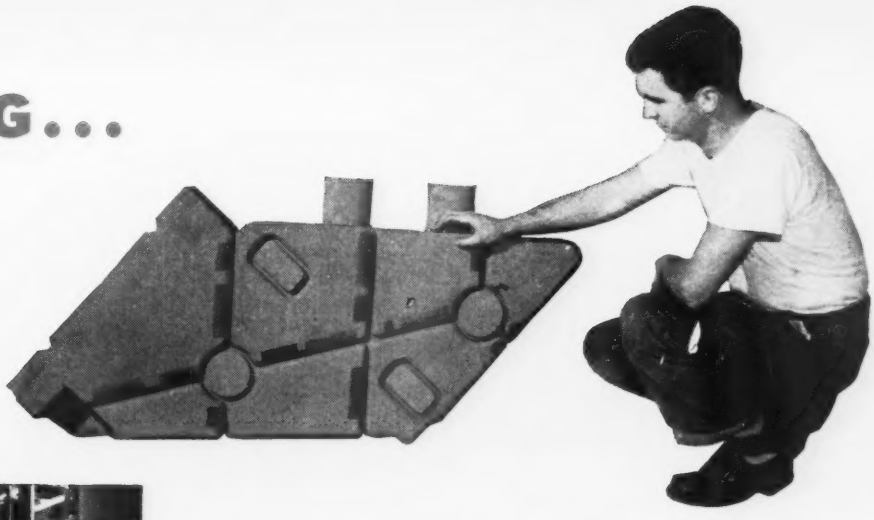
Actually, the speaker continued, the sulphur content normally is increased during acid melting by absorption from coke. Many foundries use some type of post melting treatment for desulphurization and in recent years more progressive foundrymen have turned to the basic cupola for reduction of sulphur. Phosphorus, on the other hand, has for years gone through our cupolas with neither increase nor decrease in content and will do likewise in basic cupolas unless operating conditions are adjusted especially for phosphorus removal.

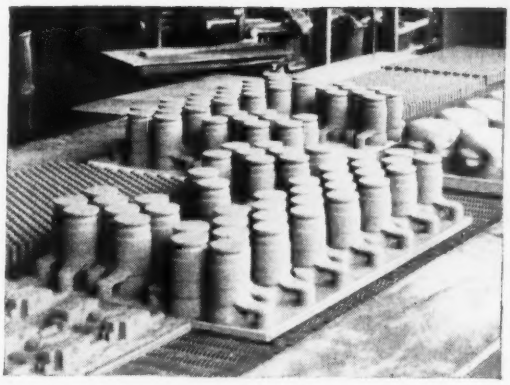
Mr. Bolt described the equipment used in his research and outlined the procedure. Based on the study, he arrived at the following conclusions: Phosphorus can be removed in the basic cupola; the removal increases with increasing oxidation; it is facilitated by lower silicon content in the metal, by lower metal temperature and by a higher percentage of limestone charged; phosphorus removal is possible without excessive carbon oxidation.

Also, more silicon than manganese is oxidized in basic cupola operation; limited desulphurization occurs with dephosphorization; refractory burn-

(*Continued on page* 142)

BIG...





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(*Continued from page* 140)

out is low at the low melting temperatures used, but the fusion of slag to the brick results in considerable brick loss when chipping out; and ladle handling or pouring castings with the low temperature metal coming from the cupola spout is impractical—duplexing or remelting is essential.

The author's final statement was "It seems logical to assume that in basic cupola operation using insulation between the shell and basic brick lining, and sufficient coke to maintain slag and metal fluidity, successful dephosphorization can be accomplished on a production basis."

Acid Cupola Slags and Some Relationships with Melting Conditions was subject of the second paper, authored by Sam Carter and Ralph Carlson, American Cast Iron Pipe Co., Birmingham. Mr. Carter made the presentation.

The paper reported compositions for 130 acid cupola slags from six different cupolas ranging in output from 1½ to 40 tons per hour and melting several combinations of charge materials. Analytical determinations were made by wet chemical and spectrographic methods. Some effects of slag condition and fluxing practice on cupola operation and iron analysis were discussed, and some attempts were made to account quantitatively for the sources of the slag constituents.

Some effects on slag composition were indicated for the following factors: Cupola size, type of lining, lining practice, type of coke, amount of coke, coke size, charging method, volume of air, size of steel scrap and hot blast. Also described were several experimental heats with unusual combinations of special fluxes.

Roundtable luncheon of the Gray Iron Division was attended by about 150. Presiding officer was W. W. Levi, Lynchburg Foundry Co., Radford, Va., and principal feature of the program was a discussion of "Casting Defects" by W. A. Hambley, Charles A. Krause Milling Co., Birmingham, Mich.

The speaker likened casting defects to chronic diseases and epidemics. They are considered major when the castings are a total loss and must be scrapped. They are still of much concern when the cost of salvaging them is considerable. They can be considered minor only when it proves economical to salvage them.

It was emphasized by Mr. Hambley that the value of castings production is around $5 billion a year. Thus, if only 1 per cent of output is scrap, the loss would represent $50 million. This seems staggering, yet a 1 per cent loss probably is ultraconservative. Scrap castings sometimes run as high as 5 per cent.

It is fallacious to think, said Mr. Hambley, that production of scrap must continue. But for it to be stopped, it is necessary to improve the morale of men. Solving of casting defects, he maintained, is in the majority of cases a matter of supervision.

Chairmen of the third gray iron session were D. E. Krause, Gray Iron Research Institute, Columbus, O., and F. T. McGuire, Deere & Co., Moline, Ill. E. A. Loria, Carborundum Co., Niagara Falls, N. Y., delivered the first paper, **Trends for the Relation of Chill Test Depth and Carbon Equivalent of Gray Cast Irons.**

Mr. Loria's paper was designed to show how chill depth can be charted more accurately with respect to the chemistry of the iron and to call attention to the marked effect of silicon on the depth of the chill. Generally, an increase in either carbon or silicon content of the iron reduced the average depth of chill.

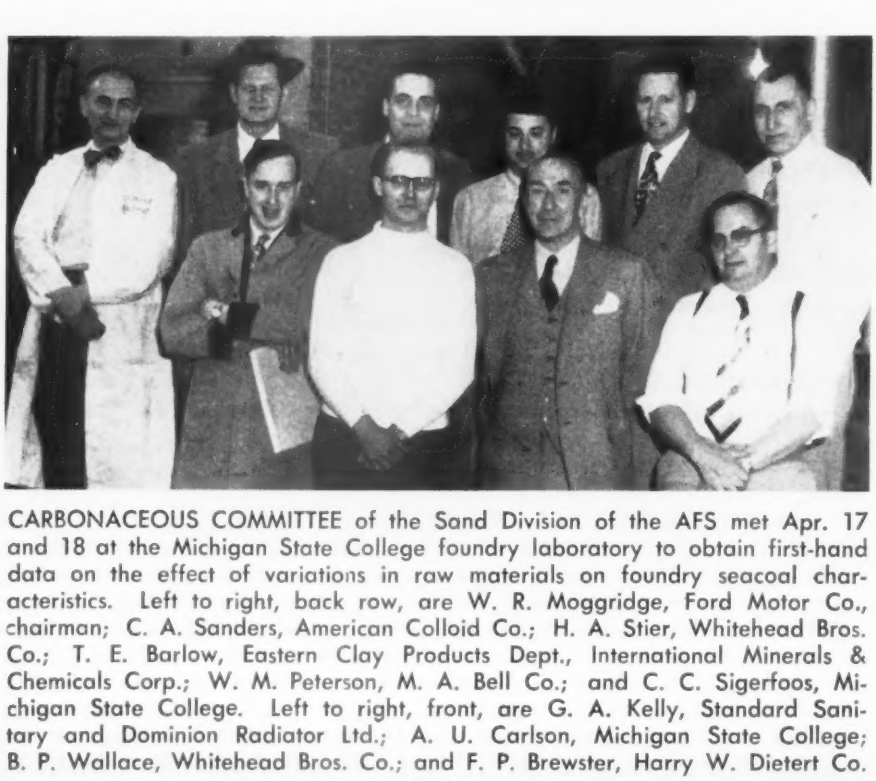
Because use of the TC + 1/3 Si parameter produced a wide scatter band of results, data were reviewed from the standpoint of separating the individual effects of carbon and silicon. This investigation revealed that the effect of silicon on chill depth, particularly for the lower carbon irons, is marked. The effect of carbon on depth of chill varies with silicon content; at low silicon contents, the influence of carbon on depth of chill is much greater than at higher silicon contents. Since the carbon equivalent may not give sufficient recognition to the potent effect of silicon in reducing chill, the data were re-evaluated on the basis of a new parameter—carbon + 1.5 silicon.

During the discussion, several persons noted that research they had done tended to confirm Mr. Loria's conclusions. E. R. Leland, Westinghouse Electric Corp., stated that he was not sure the author's findings apply to inoculated iron. Chairman Krause agreed with the author that the trends noted should be verified by considerably more data and that other chill test results should be analyzed along the lines suggested by the paper.

The second paper was **Hardening Characteristics of Induction Heated Ductile Iron,** by Edward P. Rowady and William J. Murphy, former graduate students at Lehigh University, and Joseph F. Libsch, associate professor of metallurgy, Lehigh University, and consulting metallurgist, Lepel High Frequency Laboratories Inc., New York.

The authors were interested in the possibilities of surface hardening nodular iron to provide a hard surface supported by a ductile core of good strength. They wished to de-

(*Continued on page* 144)



CARBONACEOUS COMMITTEE of the Sand Division of the AFS met Apr. 17 and 18 at the Michigan State College foundry laboratory to obtain first-hand data on the effect of variations in raw materials on foundry seacoal characteristics. Left to right, back row, are W. R. Moggridge, Ford Motor Co., chairman; C. A. Sanders, American Colloid Co.; H. A. Stier, Whitehead Bros. Co.; T. E. Barlow, Eastern Clay Products Dept., International Minerals & Chemicals Corp.; W. M. Peterson, M. A. Bell Co.; and C. C. Sigerfoos, Michigan State College. Left to right, front, are G. A. Kelly, Standard Sanitary and Dominion Radiator Ltd.; A. U. Carlson, Michigan State College; B. P. Wallace, Whitehead Bros. Co.; and F. P. Brewster, Harry W. Dietert Co.

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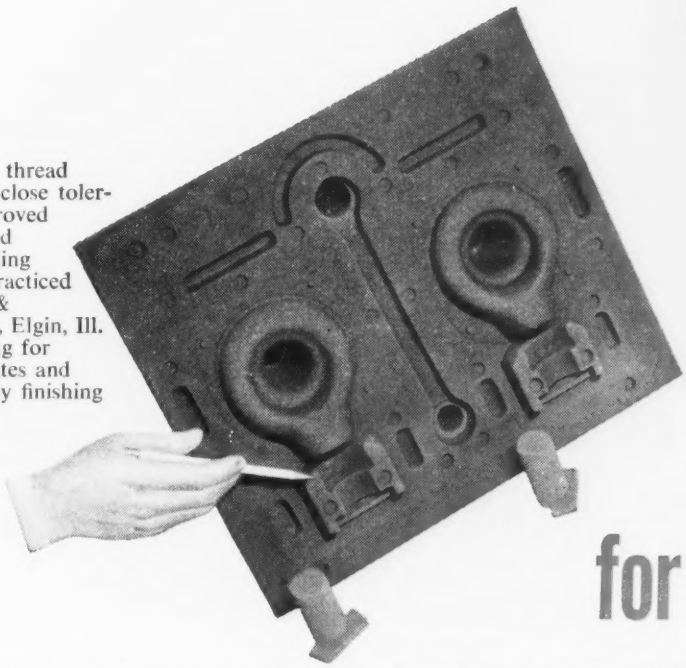
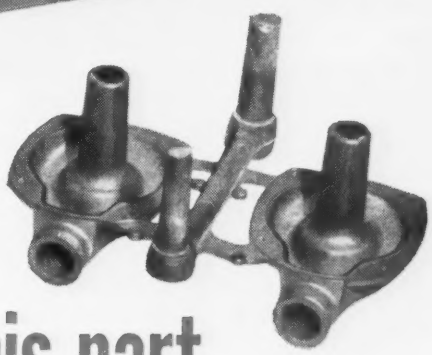


Cast-in screw thread demonstrates close tolerance and improved finish produced by shell molding technique as practiced by Woodruff & Edwards, Inc., Elgin, Ill. Minor grinding for removal of gates and runners is only finishing step required.



cast to close tolerances at much lower cost with Resinox-bonded shell molds

Shell molding helps industries producing for the mass markets to take advantage of new production efficiencies that result in:

- **lower end-unit cost**
- **greater flexibility of product design**
- **higher quality**
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For example, Hotpoint's new automatic dishwasher with its "Phantom Drain" unit. By shell-mold casting of gray iron parts, Woodruff & Edwards, Inc., who supply this part to the Hotpoint Co., sliced unit production costs nearly in half by a 100% elimination of machining costs. Threads are cast to exact specifications and close tolerances are held throughout the finshed part. Improved design was another gain, since the smoother cast surface offers less resistance to the flow of water when the dishwasher is in use.

Monsanto will be glad to tell you more about the cost-saving advantages of new foundry techniques made possible through research in industrial resins. In addition to resins for shell molding, Monsanto also supplies phenolic and urea core binders, and Lytron-886 sand conditioner. For further information on these new products and processes, fill in and mail the handy coupon below.

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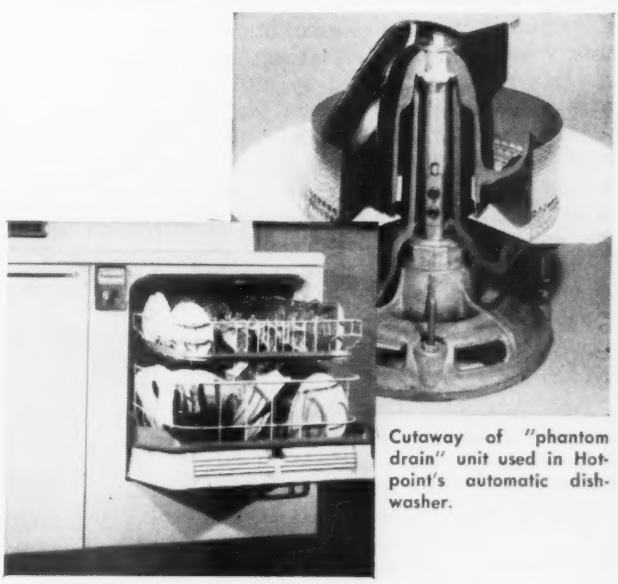

Cutaway of "phantom drain" unit used in Hotpoint's automatic dishwasher.

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(*Continued from page* 142)

termine whether nodular iron structures showing suitable core properties can be hardened successfully by rapid heating. In general, results indicate that surface hardening nodular iron by induction or flame heating should provide iron castings with high surface hardness (R_c58) and unusual core properties, although the influence of a hardened case on core properties has not yet been determined.

Fourth gray iron technical session, with G. A. Timmons, Climax Molybdenum Co., Detroit, and R. A. Clark, Electro Metallurgical Division, Union Carbide & Carbon Corp., Detroit, presiding, pertained to heat treatment for a variety of purposes.

Fundamentals of Heat Treatment of Gray Cast Iron by J. E. LaBelle, Detroit Diesel Engine Division, General Motors Co., Detroit, pointed out that by heating and cooling iron under controlled conditions, a wide variety of changes in properties of as-cast material can be obtained. Through heating and cooling the carbides are broken down, dissolved and reformed, and Mr. LaBelle indicated the general temperatures and cooling procedures employed to obtain softening, hardening and stress relief for irons containing normal carbides and massive carbides.

Stress Relieving Gray Iron, by J. H. Schaum, National Bureau of Standards, Washington, stated that stresses in casting may be caused by difference in cooling rate between inside and outside portions, by the difference in cooling rate between different section thicknesses, or by resistance to or restraint of free contraction by the mold. Stress relief usually is accomplished by heating the castings slowly to 1100 to 1200° F for 1 to 2 hr per inch of thickness, and then slowly cooling in the furnace to 300° F.

Annealing Iron Castings for Machinability by A. W. Demmler, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., emphasized that machinability is a relative term, and what might be considered reasonable machinability for an alloyed crankshaft material is quite different than that expected for an unalloyed material which does not have to withstand stresses, etc. Hence, the choice of heat treatment temperatures, etc., will vary according to the results desired.

Hardening Gray Cast Iron with Minimum Distortion, by A. A. Armstrong, Thompson Products Inc., Cleveland, indicated that excellent results are obtained with isothermal heat treatment whereby the parts are quenched from a high temperature in a molten salt or other bath maintained at a temperature which permits formation of a tempered martensite or bainite structure. Example cited was thin automotive cylinder liners preheated at 1250° F for 6 minutes, austenitized at 1500° for 8 minutes in a neutral salt bath, isothermally quenched at 480° for 28 minutes, water washed, and air drawn for 1 hr at 600° F.

Flame Hardening Cast Iron by M. R. Scott, Detroit Flame Hardening Co., Detroit, described applications of flame hardening methods and procedures followed.

Final gray iron session was under the direction of H. L. Ullrich, Sacks-Barlow Foundries, Newark, N. J., and G. P. Phillips, International Harvester Co., Chicago. **Effect of Magnesium on Eutectic Modification and Graphitization of Certain Fe-C Alloys,** by H. W. Weart and R. W. Heine, both with University of Wisconsin, was presented by Mr. Weart. It described the investigation of magnesium additions to an iron-carbon alloy low in other elements which could not be graphitized. Addition of about 0.03 per cent Mg coarsened the carbide and caused agglomeration or separation of carbide from the austenite.

Prediction of Mechanical Properties from Chemical Composition for Fully-annealed Ductile Cast Iron, by C. C. Reynolds, C. M. Adams, and H. F. Taylor, all of Massachusetts Institute of Technology, was presented by Mr. Reynolds. It described investigations which led to the development of formulas and graphs which can be used to determine physical properties of nodular irons of known composition.

FOUNDRY COSTS

ACCURACY and reduction in foundry costs were considered at the session sponsored by the Foundry Cost Committee. R. L. Lee, Grede Foundries Inc., Milwaukee, presided, assisted by C. E. Westover, Westover Engineers, Milwaukee.

Use of Standards in Controlling Costs was presented by William Busby, Texas Foundries Inc., Lufkin, Tex., who said that standards are essential, not as a par but as a comparison, to measure accomplishment. Plant managers, superintendents, and line foremen are the ones who actually do or do not control costs. Citing the comparative value of standards as practiced in the cost control program at Texas Foundries, a jobbing foundry producing malleable iron castings, Mr. Busby first considered direct labor costs.

Time study data is compiled on coremaking, molding, grinding and finishing operations, which sets production standards on all jobs run. Piece rate incentives are based upon these production standards. Weekly direct labor control reports are issued which summarize for foremen results of his operation. Daily report covering all job changes and delays is given to molding supervision, and a weekly summary gives details of control report showing individual operator's daily and weekly performance.

Examples of performance and summary reports from melting, molding, shipping, yard and plant engineering departments were shown on the screen and method of developing them was explained. Mr. Busby feels these control reports give the answers needed for management staff to compare current operation with standard. In addition to direct labor, production standards and resulting incentives have been established on indirect labor which have resulted in manufacturing cost reductions. He stated effective cost control is cost reduction effected by smart management.

Are Your Costs Reliable? by R. T. Lewis, Keen Foundry Co., Griffith, Ind., presented some of the common and pertinent discrepancies inherent in costs developed from inadequate and incorrect cost systems. Available articles and manuals published by the various foundry trade societies furnish the technical information needed. He pointed out that many foundries develop average metal cost per pound of good castings produced with reasonable accuracy but make the mis-

(*Continued on page* 146)

"nothing moves but the sand"

Brady Cloth Bag Filter installed on the Powell Plant roof. Mounted on a "Brady Metal" cyclone section. Sand conveyed is quite dry, so this unit is used to control fine sand particles.

A BRADY FLO-VEYOR SYSTEM is solid, permanent and well established. Like the monuments of Egypt, it remains constant while the sand alone moves. Conveyor lines are made of steel piping, but all bends and turns are cast of our hard wear resistant iron "Brady Metal" for long life and low maintenance cost. A Brady pneumatic conveyor system saves labor, is self-cleaning, dustless, goes through or around obstructions, and moves heavy tonnage hourly at small cost per ton.

The Brady "FLO-VEYOR" Sand Handling System installed recently at the William Powell Company Plant in Cincinnati includes a Brady Cloth Bag Filter with automatic shaking mechanism to clean the bags. Plant compressed air moves the unprepared core-sand through the pipes in a matter of seconds, and delivers it where required. There are no moving parts to the "FLO-VEYOR"; truly, nothing moves but the sand.

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"FLO-VEYOR" pressure vessel at the Powell Plant. A pressure reducing valve is used to effect sand conveyance at lowest air pressure practicable.

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(*Continued from page* 144)
take of using this average cost on all casting items.

Allocating metal cost at spout is accomplished accurately but extent of error involved is not realized as between substantial casting items having yields widely varied from foundry average. Adjusting alloy costs on basis of yield was discussed, particularly consideration of additional factor where alloy scrap is recycled into alloy melt and credit is due for such recovery. Discrepancies in cost areas in molding and core departments were cited.

If change, expansion, modernization develop, costing procedure should receive comparable revision. Failure to establish separate cost centers and overhead rates for bench, machine, blower, assembly and other types of core production can result in financial difficulties. Comprehensive cost systems, competently installed and administered, furnish valuable management tools.

Discussion of the two papers brought out questions regarding what might be considered direct costs, application of burden rates, etc. Both speakers stressed the urgency of separating direct from indirect costs and Mr. Lewis spent considerable time clarifying this subject. Any cost that can be applied directly to a job is a direct cost such as the cost of melting, cost of metal, sand. Failure to get core material at its direct cost is a most common error.

Indirect labor includes the work method improvement field — i.e. — foreman may make additions or removals in molding or pattern shop and standard will be changed to reflect the change which has increased or decreased cost of manufacture. This type of cost change can be controlled or measured through cost control or performance reports.

REFRACTORIES

ROLE of refractories in melting furnaces for steel, malleable iron and nonferrous metals was described in three papers presented at a session sponsored by the Refractories Committee. It was under the joint chairmanship of C. H. Wyman, Burnside Steel Foundry Co., Chicago, and R. A. Witschey, A. P. Green Fire Brick Co., Chicago.

Insulating an Electric Furnace Roof was the subject of a paper by C. C. Spencer, Electric Steel Castings Co., Indianapolis. The speaker said various methods were tried to increase the roof life of an electric furnace melting acid steel. The best result was approximately 170 heats per year. In 1940 an experimental roof of standard 9-in. silica brick was constructed and covered with a proprietary insulating material employed extensively in open-hearth plants. The material is an expanded vermiculite with mesh ranging from ¼-in. to fines. It is a light, fluffy aggregate mixed with water, readily troweled or floated to uniform 1-in. thickness, and is said to be equal to 7 in. thickness of fire brick. This roof stood up for 490 heats.

The general technique was adopted as standard practice. Circles for the electrode openings are built first with a wire around top and bottom to hold the brick rings in place. Starting from the water-cooled roof ring the rest of the roof is built up. No bricks are cut. Where a whole brick will not fit, the space is rammed with a mixture of ganister, fire clay and glutrin water. Life roof has been doubled in the last 12 years, from a maximum of 225 heats on the old type roof using 13-in. brick, to a less expensive 9-in. brick and a maximum of 525 heats. The average over 12 years is 400 heats per roof.

Replying to a number of questions, the speaker said the furnace was of normal 3 ton capacity, but usually ran on 5 to 6 ton heats. A 9-ft-diam roof requires only 80 lb insulating material. Former 538 kw consumption was reduced to 495 per ton. Insulated roof keeps iron oxide away from bricks, serves as an electrical insulator between cooling rings, reduces spalling by slowing down expansion rates, and effects substantial savings by using standard materials.

Correlation of Air Furnace Bottom Temperature to Refractory and Operating Practice in a Cupola-Air Furnace Duplex System, the second paper, by F. W. Jacobs and J. S. Lawrence Jr., Texas Foundries Inc., Lufkin, Tex., was presented by Mr. Jacobs. Experimental work on which the paper was based was conducted over ten months of regular production.

Thermocouples were placed under the service bottom. Several graphs compared results and showed differences in retained bottom temperatures as related to amount of ventilation on the furnace bottom, size and type brick, variable construction and operation methods, slag treatment and effect of intermittent operation. Costs expressed in manhours per ton and 9 in. equivalents of brick per ton are presented for comparison of the nine campaigns covered in the paper. Results indicate that measurement of bottom temperature is a definite aid in predicting bottom life and should be a useful control tool notably in foundries limited to the use of one air furnace where bottom failure in the middle of the week would handicap production.

During the question period, the speaker was asked if it is necessary to correlate operating temperature with size and alumina content of brick. He replied that many factors have to be considered beside the alumina content—for example, density, structure and heat conductivity, relative cost of 2½ and 3 in. bricks. There is a certain amount of difference between operating with coal and with oil. Volume and density of slag interfere with carbon control. Slag should be skimmed. Oil firing removes carbon faster than coal firing. Depth of bath is an important factor. In the opinion of one member, seven heats off one bottom does not pay. Another member reported highly satisfactory results from using two furnaces alternately.

In presenting his paper **Refractories for Indirect Arc Electric Furnaces for Nonferrous Melting,** the author, M. G. Dietl, Schaible Foundry & Brass Co., Cincinnati, stated the paper was based on replies to a questionnaire sent to nonferrous foundries for detail on their refractory practice. Analysis of replies showed the service conditions and the human element constituted important factors in the life of refractories in service.

The list of service conditions included all those familiar to prac-

(*Continued on page* 153)

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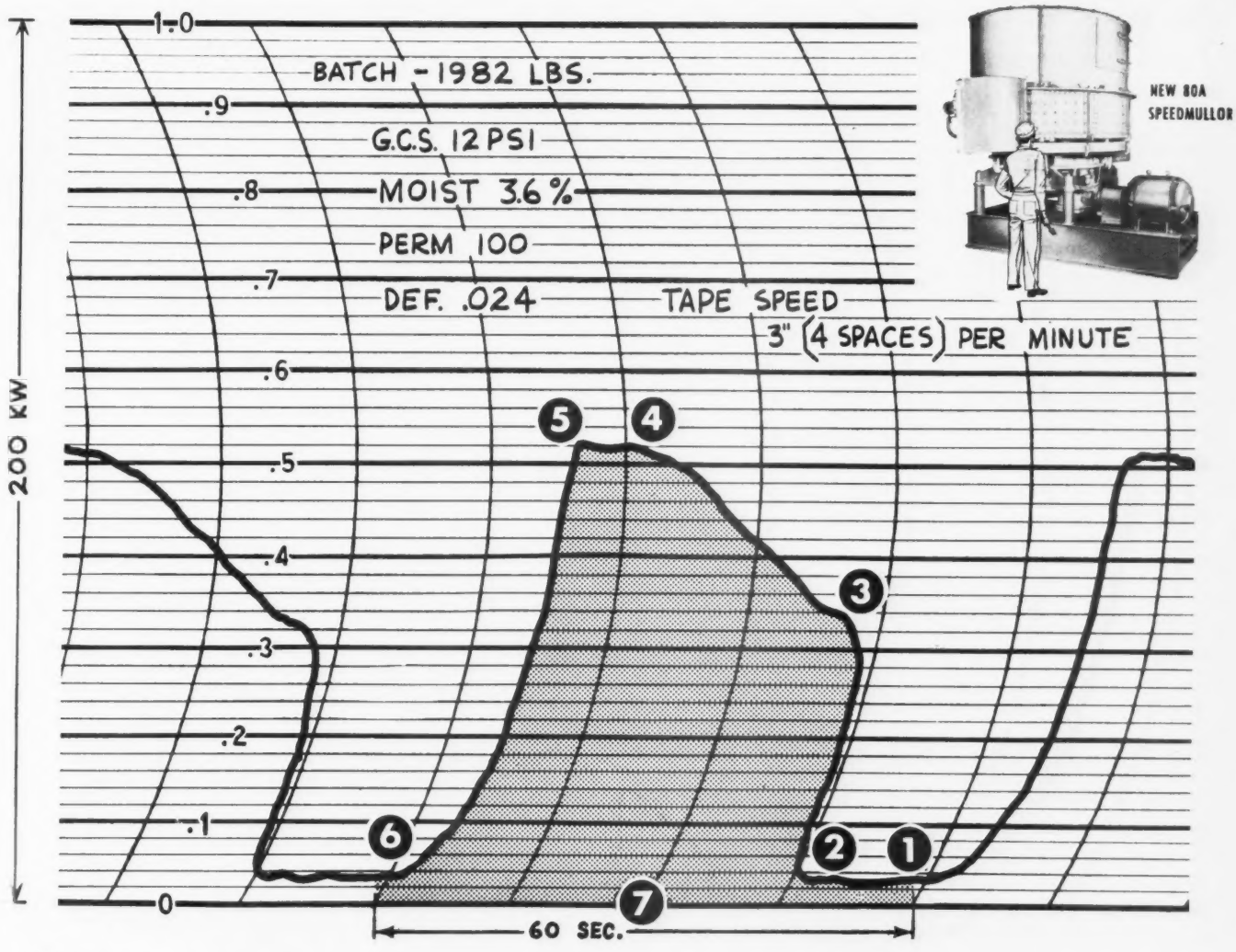
AN ACTUAL POWER GRAPH RECORD OF A 1982 LB. BATCH OF MOLDING SAND MULLED IN AN 80A SPEEDMULLOR.



1. Flush water is introduced.
2. Batch of sand and bonding additions charged.
3. "Temper water is added and strength starts developing.
4. The maximum physical properties are attained after 45 seconds . . . green compressive strength—12 p.s.i.
5. Batch is discharged after 51 seconds.
6. Discharge complete in 9 seconds (⅓ to ½ the time required by conventional muller).
7. Total elapsed cycle time—60 seconds . . . average horsepower for cycle—81.66 . . . total power consumed—1.02 K.W.H. to fully mull 1982 lb. batch.

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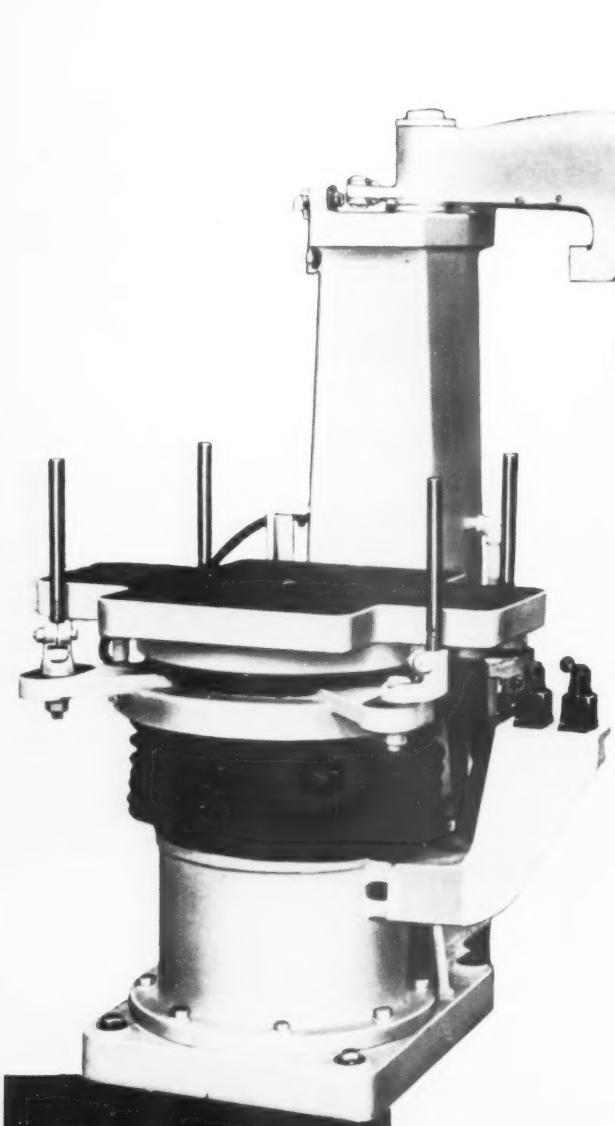

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7″ jolt cylinder
16″ squeeze cylinder
8″ pattern draw
24″ x 34″ table

513-6
5″ jolt cylinder
13″ squeeze cylinder
6″ pattern draw
19″ x 26″ table

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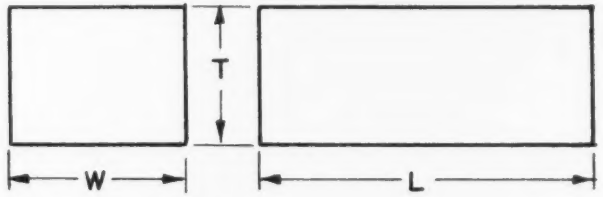
Formulas Useful in Determining Weights of Castings

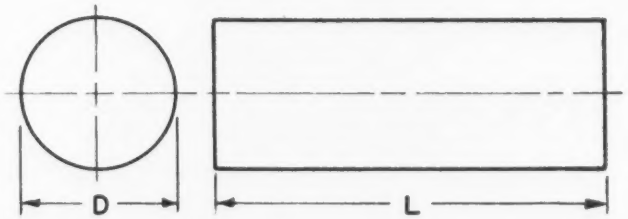
July 1953

Formulas Useful in Determining
Weights of Castings



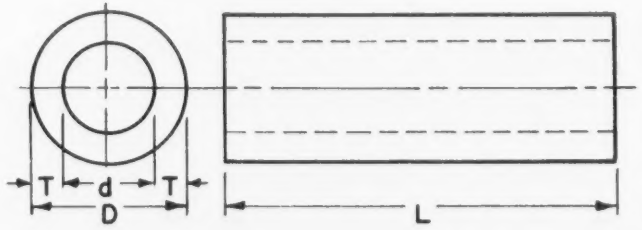
To find the weight of square or rectangular castings, multiply the length, by the width, by the thickness, by C (Table I).

$$W = L W T C$$



To find the weight of solid cylinders, the weight equals the outside diameter squared, multiplied by the length, multiplied by K (Table I).

$$W = D^2 L K$$

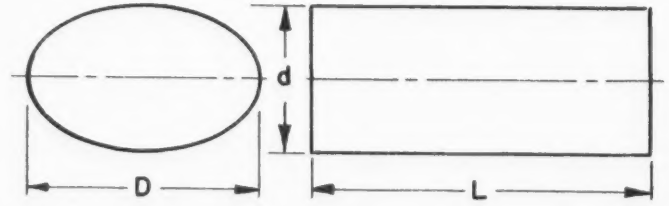


To find the weight of hollow cylinders, multiply the small or inside diameter plus the thickness, by the length, by the thickness, by M (Table I).

$$W = (d+T)\,T\,L\,M$$

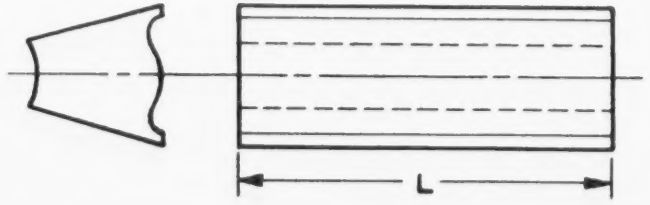
Table I

Material	C	K	M
Gray Iron	0.260	0.204	0.817
Malleable Iron	0.264	0.207	0.829
Steel	0.284	0.223	0.892
Aluminum Bronze	0.270	0.212	0.848
Aluminum-copper	0.103	0.081	0.327
Aluminum-silicon	0.096	0.075	0.302
Red Brass, Tin Bronze	0.315	0.247	0.990
Leaded Tin Bronze	0.335	0.263	1.052
Yellow Brass	0.305	0.239	0.958
Manganese Bronze	0.288	0.226	0.905
Magnesium	0.065	0.051	0.204



To find the weight of a solid ellipse, multiply the large diameter by the small diameter, by the length, by K (Table I).

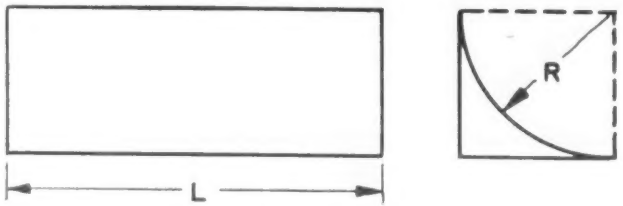
$$W = D\,d\,L\,K$$



To find the weight of a bar of irregular cross-section, multiply the area of the cross-section by the length, by the weight per cubic inch of material used (see C in Table I).

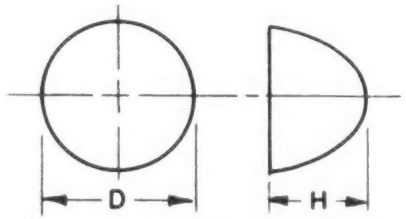
$$W = \text{Area} \times L \times \text{Wt. per cu in.}$$

(Continued from page 149)



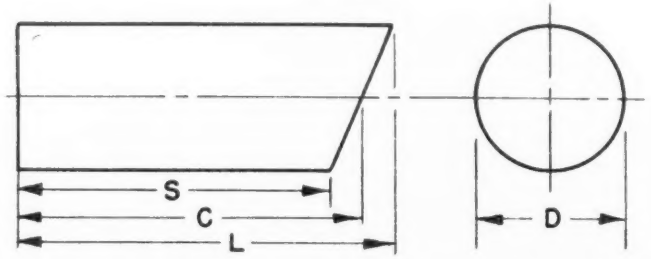
To find the weight of a straight fillet of any material, multiply the radius squared by the length, by the constant, K, corresponding to the weight per cubic inch as indicated in Table II.

$$W = R^2 L K$$



To find the weight of a paraboloid, multiply the diameter of the base squared by the height by the constant, m, whose value is indicated in Table III.

$$W = D^2 H m$$



To find the weight of a truncated circular cylinder, multiply the diameter squared by the distance on the center line from the base to the inclined section by the value of k. C is equal to one-half of the sum of S and L.

$$W = D^2 C k$$

Table II

Wt. per cu. in.	K	Wt. per cu. in.	K	Wt. per cu. in.	K	Wt. per cu. in.	K	Wt. per cu. in.	K	Wt. per cu. in.	K	Wt. per cu. in.	K	Wt. per cu. in.	K
.096	.0206	.150	.0322	.210	.0451	.270	.0580	.330	.0708	.390	.0837	.450	.0966	.510	.1094
.100	.0215	.160	.0343	.220	.0472	.280	.0601	.340	.0730	.400	.0858	.460	.0987	.520	.1116
.110	.0236	.170	.0365	.230	.0494	.290	.0622	.350	.0751	.410	.0880	.470	.1009	.530	.1138
.120	.0258	.180	.0337	.240	.0515	.300	.0644	.360	.0773	.420	.0901	.480	.1030	.540	.1159
.130	.0279	.190	.0403	.250	.0536	.310	.0665	.370	.0794	.430	.0923	.490	.1052	.550	.1180
.140	.0330	.200	.0429	.260	.0558	.320	.0687	.380	.0815	.440	.0944	.500	.1073	.560	.1202

Interpolation Table

Addit'l weight	Addit'l value of K	Addit'l weight	Addit'l value of K	Addit'l weight	Addit'l value of K
.001	.0002	.004	.0009	.007	.0015
.002	.0004	.005	.0011	.008	.0017
.003	.0006	.006	.0013	.009	.0019

Method of Interpolation

If the weight, per cubic inch of material used, lies between two of the weights given above, use the interpolation table as follows:

Subtract the lowest of the two weights from that required; add the additional value of K, corresponding to this difference, called additional weight, to the value of K, for the least of two weights, between which the required weight lies.

Required K for material, which weighs .326 pound per cubic inch. This lies between .320 and .330. Subtracting the lowest (.320) from .326 we have .006 additional value of K, for .006 = .0013
value of K, for .320 = .0687

value of K, for .326 = .0700

Table III

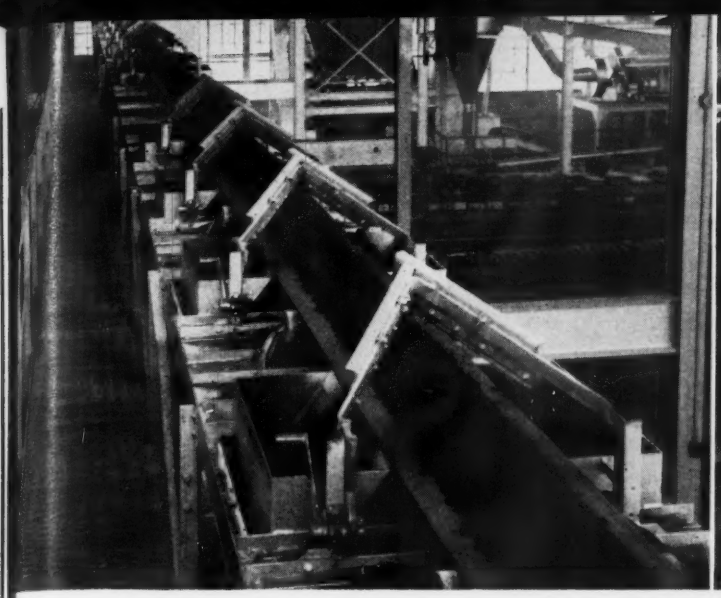
Wt. per cu. in.	k	m	Wt. per cu. in.	k	m	Wt. per cu. in.	k	m	Wt. per cu. in.	k	m
.096	.0754	.0377	.210	.1649	.0825	.330	.2592	.1296	.450	.3534	.1767
.100	.0785	.0394	.220	.1728	.0864	.340	.2670	.1335	.460	.3613	.1806
.110	.0864	.0432	.230	.1806	.0903	.350	.2749	.1374	.470	.3691	.1846
.120	.0942	.0471	.240	.1885	.0942	.360	.2827	.1414	.480	.3770	.1885
.130	.1021	.0511	.250	.1964	.0982	.370	.2906	.1453	.490	.3848	.1924
.140	.1100	.0550	.260	.2042	.1021	.380	.2985	.1492	.500	.3927	.1964
.150	.1178	.0589	.270	.2120	.1060	.390	.3063	.1532	.510	.4006	.2003
.160	.1257	.0628	.280	.2199	.1100	.400	.3142	.1571	.520	.4084	.2042
.170	.1335	.0668	.290	.2278	.1139	.410	.3220	.1610	.530	.4162	.2081
.180	.1414	.0707	.300	.2356	.1178	.420	.3299	.1649	.540	.4241	.2120
.190	.1492	.0746	.310	.2435	.1217	.430	.3377	.1689	.550	.4320	.2160
.200	.1571	.0785	.320	.2513	.1257	.440	.3456	.1728	.560	.4398	.2199

Interpolation Table

Ad'l wt.	Ad'l k	Ad'l m	Ad'l wt.	Ad'l k	Ad'l m	Ad'l wt.	Ad'l k	Ad'l m
.001	.0008	.0004	.004	.0031	.0016	.007	.0055	.0027
.002	.0016	.0008	.005	.0039	.0020	.008	.0063	.0031
.003	.0024	.0012	.006	.0047	.0024	.009	.0071	.0035

For method of interpolation see Table II.

(To be continued)



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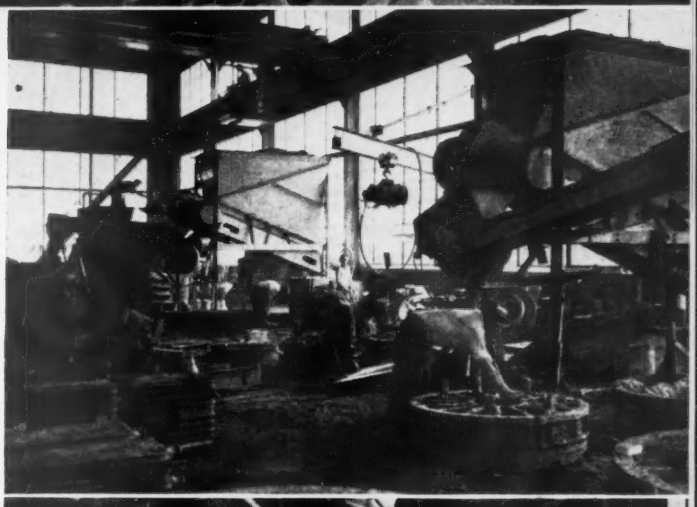

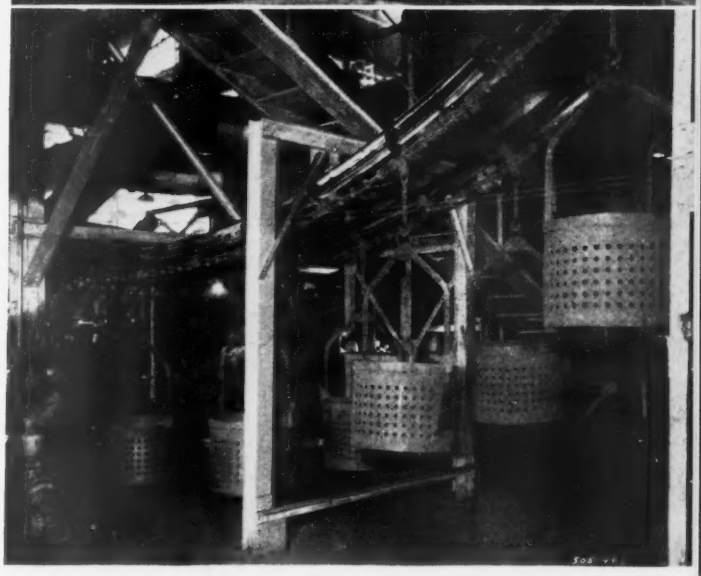

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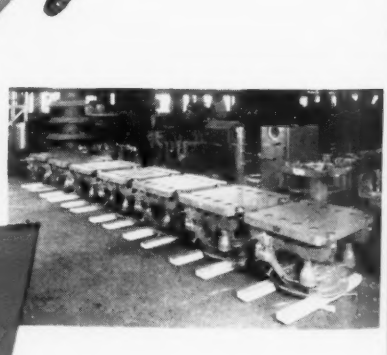

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(*Continued from page* 146)

tical operators of electric nonferrous melting furnaces, also several conditions that may be described as intermittent. The speaker referred particularly to the manner in which oxide attacks the lining to a greater degree than the metal. Highly fluid slag, resulting from operating at higher than necessary temperature, attacks lining to a greater extent than a comparatively viscous slag resulting from lower but adequate temperature.

In a rocking type furnace, the swing of the arc becomes greater and greater as the heat progresses, with consequent increase in the exposed lining area. From zero at the beginning, on account of the heavy metal charge, the swing of the arc may reach 170°. The speaker presented detailed description of the proper method for preparing and installing refractory lining materials.

Second of two refractories sessions featured papers on linings in cupolas and air furnaces and carbon as a refractory. W. R. Jaeschke, Whiting Corp., Harvey, Ill., presided and R. P. Schauss, Werner G. Smith Inc., Chicago, was co-chairman.

Gun-Placed Silica Cupola Linings was title of a contribution by T. E. Barlow and P. D. Humont, International Minerals & Chemical Corp., Chicago, and presented by the former. It was pointed out that this type of lining contains higher silica than do brick. In their application it is advisable to use a secondary flux. Slag losses, said Mr. Barlow, are not as much related to temperature as they are to slag chemistry.

The method of applying these linings, it was stated, is to hold the gun straight or vertical to the surface to which application is being made and to move the gun in a slight circular motion. Do not smooth, trowel or use an air rammer. Air drying of the gunned lining is said to be of no advantage; firing up immediately after patching gives the best results.

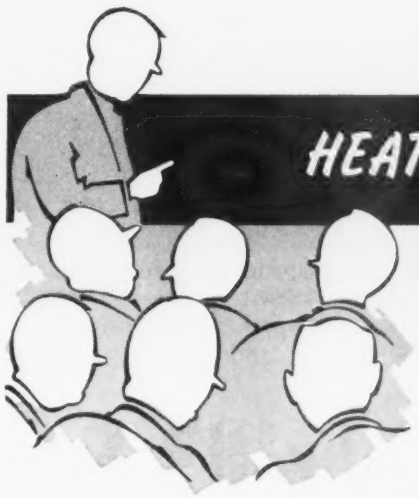
Effects of Operating Practice on Refractory Life in the Periodic Air Furnace was subject of the second paper, presented by C. F. Semrau, Illinois Malleable Iron Co., Chicago. The speaker gave a detailed description of furnace lining which gives the best service life. Faulty masonry, he said, often is more responsible for failure than the refractory itself. Best experience of this company was with the convex furnace bottom.

Fabricated Carbon as a Refractory, the concluding paper, was authored by T. J. Wilde, M. R. Hatfield and V. J. Nolan, National Carbon Co., New York. In making the presentation, Mr. Wilde said that carbon in several forms has been applied successfully in the cupola well and in the runout trough or skimmer.

Carbon ramming mix, which is a material all carbon but in a semiplastic form after heating, was the first carbon material used as a lining in the well. A 6-in.-thick lining of carbon ramming mix was formed inside of the ceramic lining and extended up from the pan to the tuyeres. The carbon ramming mix was then applied to the trough outside the refractory lining. The absence of slag attack on the carbon has made it possible for carbon to remain in the cupola for long periods of time with small repairs during shutdown periods.

According to Mr. Wilde, cupolas with carbon linings can be and frequently are banked overnight or for a few hours. This makes it unnecessary to drop bottom. Metal or slag does not stick to carbon.

In the discussion period, Chairman Jaeschke commented that the banking of cupolas with the usual acid lining is not feasible.



HEAT TRANSFER

REVIEW of the first eight years of AFS heat transfer research was presented by W. S. Pellini, Naval Research Laboratory, Washington, at the first of two sessions sponsored by the Heat Transfer Committee. C. E. Sims, Battelle Memorial Institute, Columbus, O., and J. B. Caine, Cincinnati, presided.

Mr. Pellini discussed some of the early work on heat transfer problems with use of the electrical analogue developed by Dr. Victor Paschkis, technical director, heat and mass flow analyzer laboratory, Columbia University. This device, which overcomes certain limitations of bleed tests, has had its predictions confirmed by thermal analysis methods developed at the Naval Research Laboratory. Results of the various studies of metal solidification were described.

The speaker indicated that a considerable number of important investigations concerned with single direction heat flow remain for future work. These include studies concerned with the effect of solidification features of various metals and with the effects of shape on solidification time; also investigations of heat flow rates in sands and their effects on both the solidification of the metal and the sand itself.

Two papers, both highly technical in character, featured the second heat transfer session. E. C. Troy, foundry engineer, Palmyra, N. J., presided, and J. B. Caine was co-chairman.

First paper—**Solidification of Cylinders**—presented by Dr. Paschkis, constituted a progress report on an AFS sponsored research project on heat transfer. In introduction, the speaker pointed out that all projects carried out so far in the co-operative endeavor between AFS and the university deal with greatly simplified conditions in which heat flow occurs in one direction only.

Slabs, for example, were thought of being sufficiently long and wide so as to permit disregarding all end effects; heat flow and solidification would proceed only in the direction of thickness, perpendicular to the surface of the slab. Spheres are, mathematically speaking, one-dimensional problems. Cylinders, as far as they have been treated to date, Dr. Paschkis continued, were considered to have been so long that heat flow through the ends could be disregarded and solidification and heat flow were thought of occurring in radial direction only.

Actual castings always do have end effects; therefore, he explained, work was undertaken to show the increased rate of solidification in bodies exposed to cooling in two directions. Specifically, a cylinder of finite length was selected. Previous investigations of that laboratory had established for cylinders only times to reach the liquidus; therefore complete solidification of a cylinder without end effects was now studied, to

(*Continued on page* 156)

30,000 TONS OF MALLEABLE IRON are annealed annually in these two rows of G-E bell-type electric furnaces at National Malleable and Steel Castings Company. Of sturdy, compact structure, G-E furnaces assure years of dependable service while conserving floor space. Cleanliness of installation improves working conditions and contributes to high outpu

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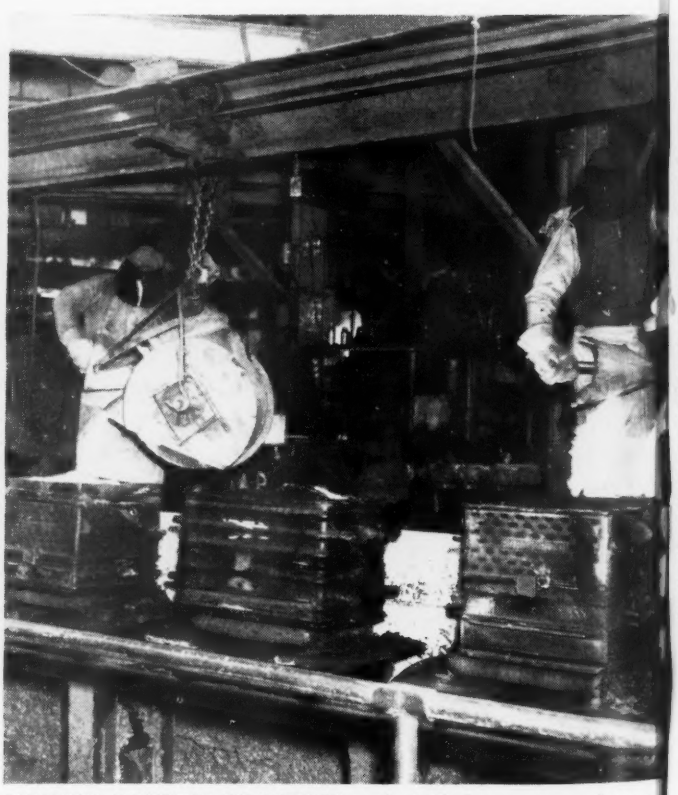

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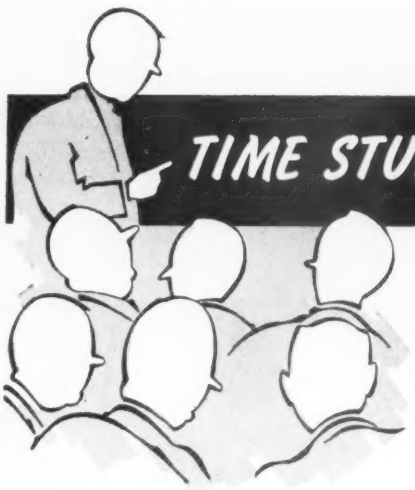
(*Continued from page* 153)
serve as basis for a comparison with two-dimensional freezing—as for example a cylinder with end effects.

Some highly technical conclusions were reached as result of the research, but they suggested the need for further investigation and certain expansions in the work.

Solidification at Corner and Core Positions was title of the second paper, authored by F. A. Brandt and H. F. Bishop, metallurgists, and W. S. Pellini, Naval Research Laboratory, Washington, and presented by Mr. Bishop. In the investigation described, the solidification characteristics of cast steel plates joined as "L" and "T" sections and of bushings of various inside diameters were determined by thermal analysis.

It was established that "L" and "T" sections require 1⅓ and 1½ longer time for solidification than flat plates. The solidification time of bushings is longer than that of flat plates of equivalent thickness by an amount which depends on the core diameter; however, the effect does not exceed 15 per cent, which amount is obtained with core diameters of ¼ to ½ the wall thickness.

The paper discussed the relation of geometric and effective volume to surface area ratios with respect to the solidification times. Effects of casting geometry on the rate of heat flow from casting to sand which determine solidification rates were shown to be related to the features of divergency or convergency of heat flow patterns in the sand.



TIME STUDY and METHODS

AT THE two sessions sponsored by the Timestudy and Methods Committee, interest and progress were noticeably increased, as compared with meetings on this subject previously included in convention coverage. About 125 attended the opening meeting at which Dean Van Order, Burnside Steel Foundry Co., Chicago, and J. J. Farkas, Cincinnati Milling Machine Co., Cincinnati, presided.

Wage Incentive for C st and Production Control for Indirect Operators, presented by C. J. Pruet, chief industrial engineer, McWane Cast Iron Pipe Co., Birmingham, applied only to a plan for cost, quality and production control of indirect work. He defined it as work required indirectly to assist or service employees who perform direct work, i.e.—oilers, sweepers, repair men, supervision, etc.

Mr. Pruet outlined an incentive plan, applied first in the McWane production departments in 1937, which in 1949 was extended to the machine shop and general plant maintenance groups and resulted in a substantial increase in wages for employees and decrease in unit costs. Merit of the plan lies in the method of keeping track of work, delay time and performance of various departments. Part of the supervisory incentive is based on level of performance of both direct and indirect operators in the department. Lost time, rework, excess handling, overtime increment and other excess costs over which supervision has responsibility and control are charged against supervision incentive. All supervisory and indirect operator incentive earnings are based upon performance of entire department, both indirect and direct.

Summarizing the advantages of the wage incentive plan it was noted that it affords a medium of measurement and comparison of performances of all types of operations and departments, provides controls over quality, quantity, rework, lost time, safety, good housekeeping, maintenance, supervision, etc. and eliminates complaints of indirect employees concerning difference in their take-home pay and that of direct employees working on incentive jobs.

In subsequent discussion Mr. Pruet explained the staff required to keep the records at the McWane company includes four timestudy engineers, three clerks and seven production and time checkers. Asked if the data on charts must be as detailed as shown in his illustrations he replied that in order to acquire sufficient information for the time study it is essential to have as much data as he had shown.

An interesting subject was discussed concerning disabled workers. In some plants a veteran is retired to yard work at the same rate of pay he received when incapacitated. It was disclosed that no personnel was lost by absorbing veteran workers in this way. The question was raised as to whether it would be better to pension men not ablebodied rather than absorb them. The industry has to solve this problem, it was decided.

How to stop chiseling was asked and brought the reply that if it could be eliminated entirely everybody would be happy but as yet there is no clear cut solution for it. Asked how inspection standards were set, Mr. Pruet stated that a foreman passes on a worker's qualifications as an inspector. If no complaints are received from the customer it is reasonable to assume the inspector is doing a good job.

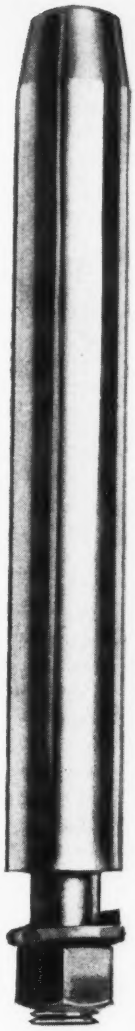
The group's second session had as its chairman J. A. Westover, Westover Engineers, Milwaukee, with H. R. Williams, Williams Management Engineering, Milwaukee, as co-chairman. An analysis of **Developing Standard Data Tables for Core Finishing** was presented by L. L. Martin, Sterling Foundry Co., Wellington, O.

Mr. Martin stated that to be successful, such standards must be consistent and fair; that the workmen must have confidence in them and the specifications by which they have been set. Advantages are that standards may be developed in less time than with direct time studies and they also are valuable in predetermining costs when bidding on new business.

Because the work in Sterling Foundry's core finishing department is handled more on a team than on an individual basis, all work done by the department was analyzed from the time the core was removed from the oven until it was placed in storage. It was also decided that the most desirable standard would correspond to the individual piece, whether assembled with another core or finished individually.

Gathering the information from elemental time studies was performed on a comparison sheet. One section recorded the physical characteristics of the core and a second portion listed the elements of work encountered during the finishing operations. Each element was speed

(*Concluded on page* 158)



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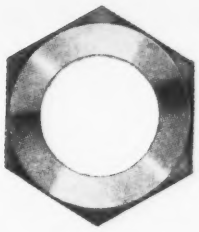
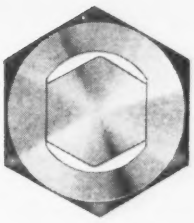
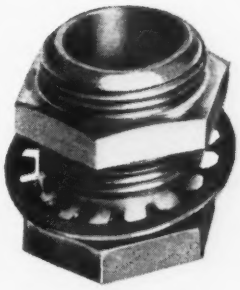
Hardened, Ground
Hard Chrome Plated



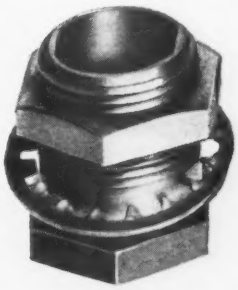
Adams Round Bushing
(End View)
Open



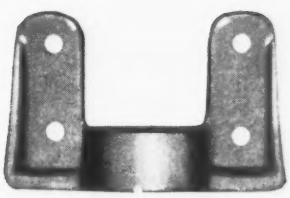
Adams Elongated Bushing
(End View)
Hexagon Pin Inserted

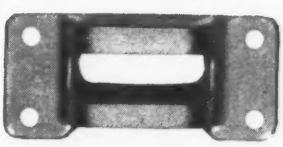


Adams Round Bushing
Nut and Lock Washer
Long Flask
Short Plate

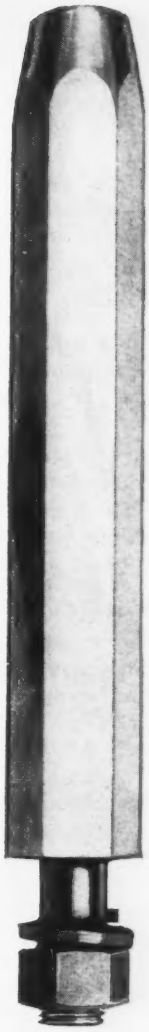


Adams Elongated Bushing
Nut and Lock Washer
Long Flask
Short Plate





Adams Pin and Bushing Mountings
(Cast Aluminum)
For Cherry Flasks
For Small Flasks—(Standard)



Adams Hexagon Pin
Hardened, Ground,
Hard Chrome Plated

Adams Pins and Bushings for Cherry and Aluminum Flasks assure you top quality and precision for close tolerance operation.

Proper mountings for pins and bushings for all Cherry Flasks are offered to meet practically all of your requirements.

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LET ADAMS HELP YOU ANALYZE YOUR FLASK EQUIPMENT PROBLEMS

The ADAMS Company

ESTABLISHED 1883

MOLDING MACHINES and FLASK EQUIPMENT

(*Concluded from page* 156)

rated to 100 per cent and then relaxation allowances were plotted consistent with those for other jobs in the plant.

Mr. Martin outlined the various work elements performed in the finishing department and discussed the methods of determining time standards for each. He said the standards were given a three-week tryout under working conditions to determine their accuracy. This also allowed the men in the department to familiarize themselves with the standards.

A necessary accessory for the use of the newly developed standards was a Core Finishing Factor Card which was designed to show all the operations performed. Total finishing standard for each core is figured to the nearest tenth of a minute, and that standard is recorded on the master standard record. If any change occurs in the equipment or method of finishing a core, a new factor card is made out showing the new standard.

Mr. Martin concluded by emphasizing the need for preparing a detailed write-up which should include a resume of all equipment and materials used and explanations of all elements and relaxation allowances. Photographs or floor plan sketches of the work area and location of equipment are helpful. Whenever any change of method or equipment is made, the time standard tables affected should be checked.

In his paper, **Conveyor Molding Standards,** Everett C. Reid, Ford Motor Co. of Canada, Windsor, Ont., Canada, presented a method of developing time standards for mechanized molding lines.

He stated the main objects in developing such standards are to establish: A time standard that will show the total direct labor allowed to produce the casting under specified standard conditions; a standard conveyor line speed that will result in performance to standard; the number of men necessary to man the line when work is distributed equitably and standard line speed is maintained; and the basis for economic scheduling of castings assigned to the line and for cost comparison of alternative production plans.

Mr. Reid divided this study into seven phases:

1. Planning, which is done with the help of a sheet which lists basic operations performed on each casting, the grouping of castings on the line, manpower currently assigned per operation, a notation for the type of study judged to be necessary, and the man assigned to the specific study. This also serves as a progress report on the time study.

2. Procedures for collecting and recording existing process and allowance data.

3. Measurement and development of standard time. This is of prime importance, because it is necessary to find the "control" operation, or the one which requires the most work time to complete. In measuring non-control operations the only requirement is to determine that the work consumes less time than the control station.

4. Line balancing, crew assignment and calculation of final time standards.

5. Development of records and authorities.

6. Publication of an installation report to allow supervision to review the standards and iron out misunderstandings and misinterpretations. In the speaker's opinion, a good standards installation, which has not been sold to supervision and management so they provide active help in making it work, is worse than useless.

7. Maintenance of standards and performance analysis.

Lauds Engineering Career

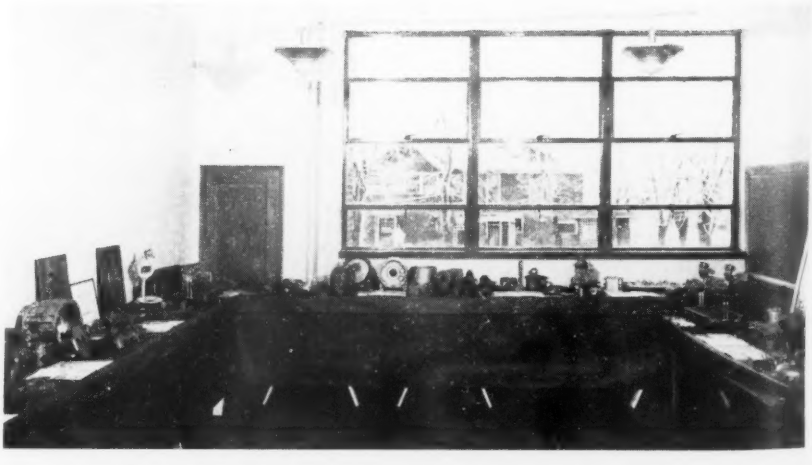
A pamphlet entitled "Engineering—A Creative Profession" has been issued by the Engineers' Council for Professional Development to replace its previous publication, "Engineering as a Career." Designed to tell students and other young people what an engineer is and does and what function he performs in modern society, the pamphlet is available at 25 cents per copy (or 20 cents per copy, quantities of 50 or more) from the council, 29-33 West 39th St., New York 18.

Book Review

Mechanics of Materials, by Seibert Fairman and Chester S. Cutshall, cloth, 420 pages, 6 x 9 in., published by John Wiley & Sons Inc., New York. Price $5.75.

The authors, both professors of engineering mechanics at Purdue University, have attempted to give a thorough presentation of the mechanics of materials in such a manner that it can be grasped readily by the average engineering student. To that end, they have attempted to make the book useful to students. To assist them in learning how to apply the theory, over 700 completely solved problems are provided.

The area-moment method for beam deflections and analysis of statically indeterminate beams is emphasized, and a thorough treatment of combined stresses is afforded. The treatment of columns is designed to give students better understanding of the basic theory and its connection to the development of the empirical formulas used in practical design. Certain advanced topics that are primarily applications to some special field—such as structural connections, riveting of plate girders, shear flow and others—have been eliminated as nonessential in an elementary book.



HIGH SCHOOL EXHIBIT of gray iron castings was sponsored by Decatur Casting Co., Decatur, Ind., at the local high school Apr. 20-24. Also open to the public, the display was in charge of a company engineer who explained foundry processes to visitors. Display arrangements were made through Hugh J. Andrews, school principal, and Deane Dorwin, vocational guidance department. The company has given copies of the book *Foundry Work* to Decatur schools and has had groups of students visit its plant

A Good First Mate to Have Aboard

SMITH L-O CORE OIL

And, another good "first mate" to have aboard is the Smith L-O representative in your territory. More than an oil salesman . . . more than an order taker, he is qualified — and anxious — to study your production facilities and casting specifications. From his observations he can determine the grade of Smith L-O that will bring the most uniform results in your core-making.

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Why not consult your Smith L-O practical foundry serviceman for a thorough survey of your particular requirements. You'll find *his call* well worth *your* time.

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Foundry Developments

By EDWIN BREMER

MANGANESE bronze castings 13 in. thick are cut up for remelting by powder-cutting in less than half the time needed to cold-saw similar castings only 4 in. thick, according to Linde Air Products Co. Division, Union Carbide & Carbon Corp., New York. Use of the procedure in reclaiming 3 tons of castings made as part of an experimental program to develop accurate

Powdercutting torch cuts manganese-bronze castings for remelting

flywheels for non-magnetic diesel engines, saved one foundry about $2000.

* * *

APPARENTLY theft of metal from foundries and other firms is not confined to any one country, according to the following item in a recent issue of our British contemporary *Foundry Trade Journal*: "Driven 'almost to distraction' by the constant theft of metal from their premises, G. & R. Thomas Ltd., Hatherton Blast Furnaces, Bloxwich, Walsall, have decided to introduce Alsatian guard dogs which will patrol the factory and grounds at night and during weekends in an effort to discourage the thieves. The first of the dogs is expected to be 'on duty' within the next few days."

* * *

SOME years ago, in discussing burn-out of cupola refractories, someone presented some interesting figures on possible costs of materials other than the refractories themselves. Information was gathered in melting 54 tons of iron in a 54-in. ID cupola where the burn-out happened to be a little more than normal but not excessively so. Refractory loss was nearly 3600 lb, and calculations indicated that a little over 400 lb of coke was required to melt the refractory and help turn it into slag. Other calculations showed that about 80 per cent of the limestone used for fluxing was required to slag the lining, and 367 lb of coke was needed to calcine and melt the stone. Hence, it is easy to see that cost of the extra coke and limestone as well as the cost of hauling away the extra slag can run into a sizable amount.

* * *

"MOLD Design for Casting Steel in Sand" is the title of a 14-page mimeographed report recently issued by the Office of Technical Services, U. S. Department of Commerce, Washington 25. Report PB 111100 is available for 25 cents, and discusses molds, sand, design, steel, and casting.

* * *

RECENTLY completed fifth chest x-ray survey held in the past six years at the plant of the Beryllium Corp., Reading, Pa., did not reveal a single case of disease attributable to beryllium. Firm's entire personnel of more than 450 voluntarily participated in the survey which was conducted by the Pennsylvania Health Department's Bureau of Industrial Hygiene under the supervision of Dr. Joseph Shilen, medical director. According to Dr. Shilen, the employees have been free from beryllium poisoning despite their exposure to some dust of the metal in the atmosphere—an exposure which is inescapable even though safety precautions and devices are employed in the plant.

* * *

PRESENTLY in the field-testing stage is a new pressure-die casting lubricant containing molybdenum disulphide which is claimed to give excellent results with small aluminum alloy castings, and further study is expected to extend its application to all sizes of die castings. On new die surfaces good adherence of the lubricant is obtained, but on old dies careful cleaning is required to remove all of the previously used lubricant.

* * *

ARTICLE by J. W. Dews on "Design, Installation and Operation of a Water-cooled Cupola," published in the May 7 issue of *Foundry Trade Journal*, points out that, before conversion, the 38-in.-diam cupola running 4-hour heats had to be completely relined with brick each year at a cost of $322, and patching over the same period cost $2800, or a total of $3122 for maintenance (materials only). After installation of water-cooling segments materials costs are estimated at $980, and cost of water and power as $70, or a total of $1050. Article also states that slag production has been reduced 50 per cent.

* * *

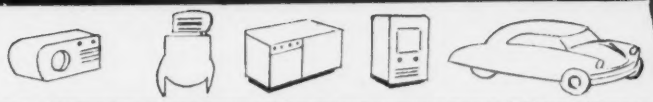
INSTALLATION of a pneumatic tube system between laboratory and melting department is advantageous, especially if they are located some distance apart, according to Standard Conveyor Co., North St. Paul, Minn. It not only expedites the delivery of test specimens and reports from one to the other, but also saves manpower since neither melting department nor laboratory personnel is required to act as carriers for those materials.

Samples and reports rushed between departments by pneumatic carriers

* * *

METALLURGISTS at Battelle Memorial Institute, Columbus, O., have developed a new copper-base alloy which possesses good electrical conductivity, corrosion resistance and springiness. Alloy contains about 10 per cent nickel, 1.5 per cent silicon and 5 per cent aluminum, and while its electrical conductivity and strength are not quite as high as in the case of copper-beryllium alloys, its properties are adequate for many uses.

HOW AMERICA OUT-PRODUCES THE WORLD



Logan Roller Conveyor does the hauling and jib cranes do the lifting in this modern gray iron foundry molding room. Other Logan Conveyors serve pouring, cooling, grinding, and machining operations.

6

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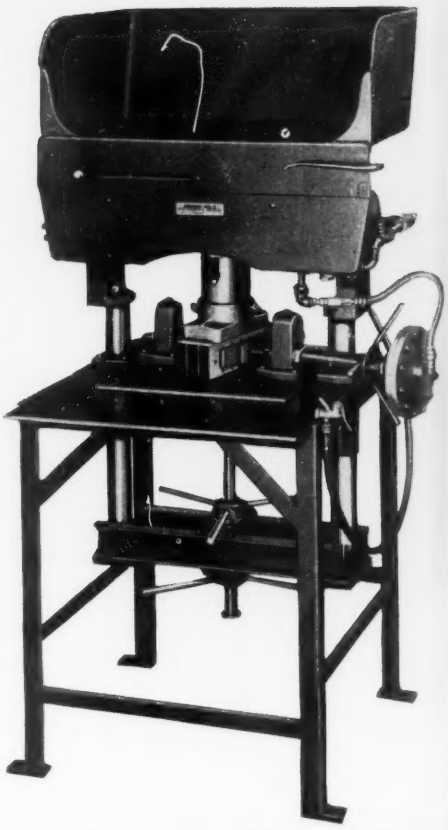
Redford CORE BLOWERS

Assure MAXIMUM Production With MINIMUM Effort



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8 OUTSTANDING FEATURES:

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3. Stationary sand magazine.
4. Easy accurate locating of core boxes.
5. Quick change magazine heads.
6. Quick adjustment for different height core boxes.
7. Quick change, fully adjustable, vertical clamping attachment.
8. Actuating one handle clamps the core box, blows the core and releases the core box, in two seconds.

CAPACITY: Cores up to 5#

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THE No. 2-D CORE BLOWER

A fast and accurate DRAW TYPE core blower for small work—has stationary sand magazine and many additional features assuring maximum production. Quickly adjusted to accommodate core boxes not requiring the draw feature. Can be equipped with clamping attachment for vertically split core boxes.

SIX FEATURES:

1. MAXIMUM SAFETY—Operator must use both hands at once to clamp core box and blow cores.
2. ACCURATE DRAW—Stationary sand magazine and long lead on draw table shaft assure accurate draw.
3. ADJUSTABLE LENGTH OF DRAW—Quickly changed without changing height of table.
4. FLEXIBILITY—Easy adjustments permit use of draw feature even on short run jobs. Draw type magazine heads having removable blow plates are interchangeable with regular No. 2 magazine heads.
5. CORE BOX VIBRATION—Controlled by keeping draw valve handle depressed during draw operation.
6. PROVEN—The No. 2-D is being used in leading foundries everywhere. Backed by the Redford reputation for quality equipment.

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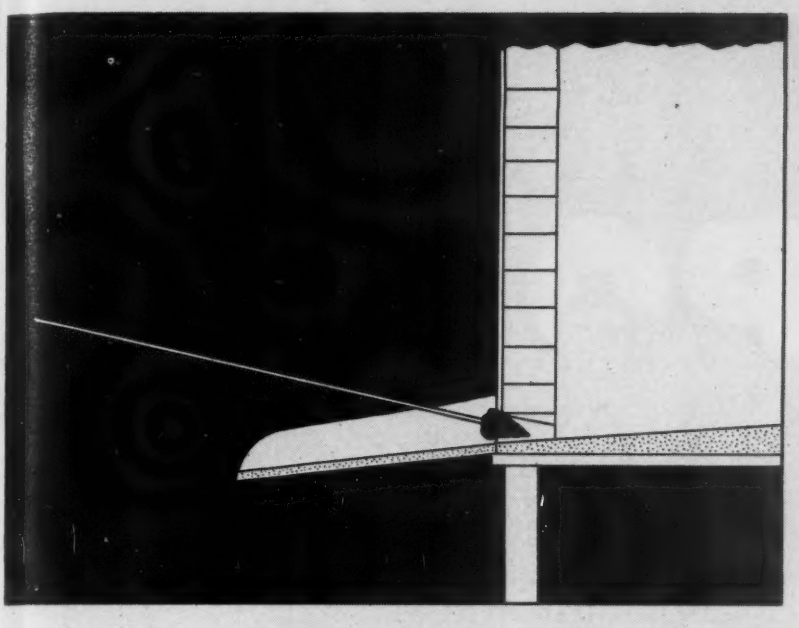


ABC of Foundry Practice

Bott should be applied to the tap hole downward at about a 30-degree angle, to prevent metal splashing

How To Bott the Cupola Tap Hole

By PAT DWYER, *Engineering Editor*

FUNDAMENTALLY, melting iron in a cupola is a simple operation. Coke and iron are arranged in alternate layers until the cupola is filled to the charging door. The coke is ignited, a sufficient volume of air is admitted to promote rapid combustion. An intense heat is developed which melts the iron. The molten iron trickles through the fuel bed and after a sufficient quantity collects in the well it is drawn off through the tap hole. As the iron is taken away at the bottom, additional iron and coke are charged at the top.

To one not familiar with foundry practice nothing could be more simple. To the foundryman who has studied the subject to any extent, endless ramifications present themselves. Unless the closest attention is paid to every detail, unless every factor connected with the operation is co-ordinated and synchronized, the cupola can produce more trouble in a foundry than any other element entering into the production of castings.

This is illustrated by a recent inquiry from a reader who reported trouble with a 32-in. cupola. He found it hard to open the tap hole. As the heat progresses the tap hole gradually became smaller, until near the end of the heat, the metal just trickled through in a pitifully small stream. Our inquirer sought information on the composition of the best bott material, and the best method for stopping or plugging the tap hole.

Two forms of temptation confront the man who attempts to discuss cupola practice. In one he is inclined to go too far into detail on actual operating conditions, and cover ground that is familiar to all foundrymen. In the other he is apt to soar away into the rare atmosphere of pure science among the theories and underlying causes of complete combustion, chemical reactions, and the peculiar action of gases and the various component elements of cast iron. So far as possible we shall avoid the two extremes and confine comment to a few phases of cupola practice which in many foundries do not receive the attention they warrant.

Small cupolas require more skilled supervision to be operated efficiently than do large ones. Unless the rules are followed strictly with a small cupola it will melt erratically, temperature of the iron will vary during the heat and, most common trouble of all, it will bridge across above the tuyeres and discontinue melting.

The whole process of efficient cupola melting hinges on three main factors. The first is supplying the maximum amount of air to consume a given amount of coke in a definite time. The second requires proportioning the charges so that each layer of iron is melted by the time the underlying layer of coke is consumed, thus maintaining the melting zone at the same point throughout the heat. The third requires providing a suitable quantity of some fluxing agent that will create a liquid slag that can be removed steadily to keep the cupola clean.

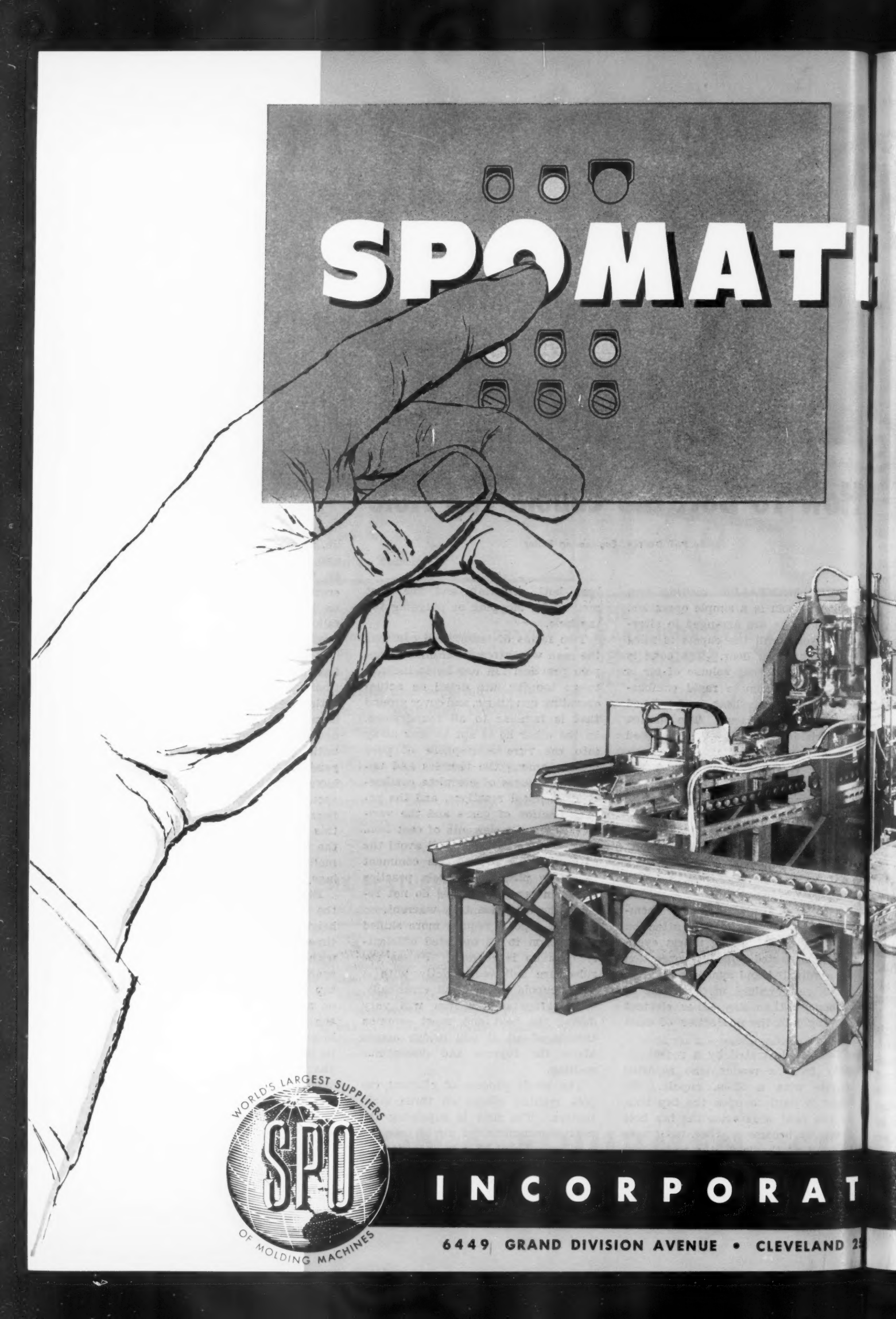
According to a popular old story, usually credited to Benjamin Franklin, a great battle was lost because a nail fell out of a horse's shoe. While all the main factors in cupola operation may be perfect, a heat may be lost or partly lost through the failure of a small or apparently insignificant factor.

Perhaps the most deeply intrenched among the 57 misconceptions in the average cupola tender's articles of faith is the belief that it is necessary to leave the tap hole open after the wind goes on and until varying amounts of iron, depending on the size of the cupola, have been allowed to run over the spout into a shallow basin in the floor. The claim is advanced that this procedure is necessary to heat the tap hole, also that the first iron melted is not fit to pour into castings.

Between 5 and 10 minutes after the wind goes on, depending on the height of the bed and the length of time the cupola has been standing with the fire burning, a shower of sparks comes flying out through the tap hole. The cupola tender stands on a raised platform at one side of the spout where he is attending a large cupola—or directly in front if he is attending a small cupola—until the iron runs freely from the spout. When in his judgment a sufficient quantity has run through, he closes the tap hole and allows the iron to accumulate on the inside. Subsequently he taps the cupola at more or less regular intervals.

All the mess incident to practice

(*Concluded on page* 166)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The SPOMATIC makes accurate copes and drags *simultaneously* . . . sets the cores . . . closes the molds . . . and puts them on the pouring conveyor. After molds have been poured and cooled, the SPOMATIC knocks out, cleans and separates the flasks and feeds them back into their respective ramming machines for immediate reuse.

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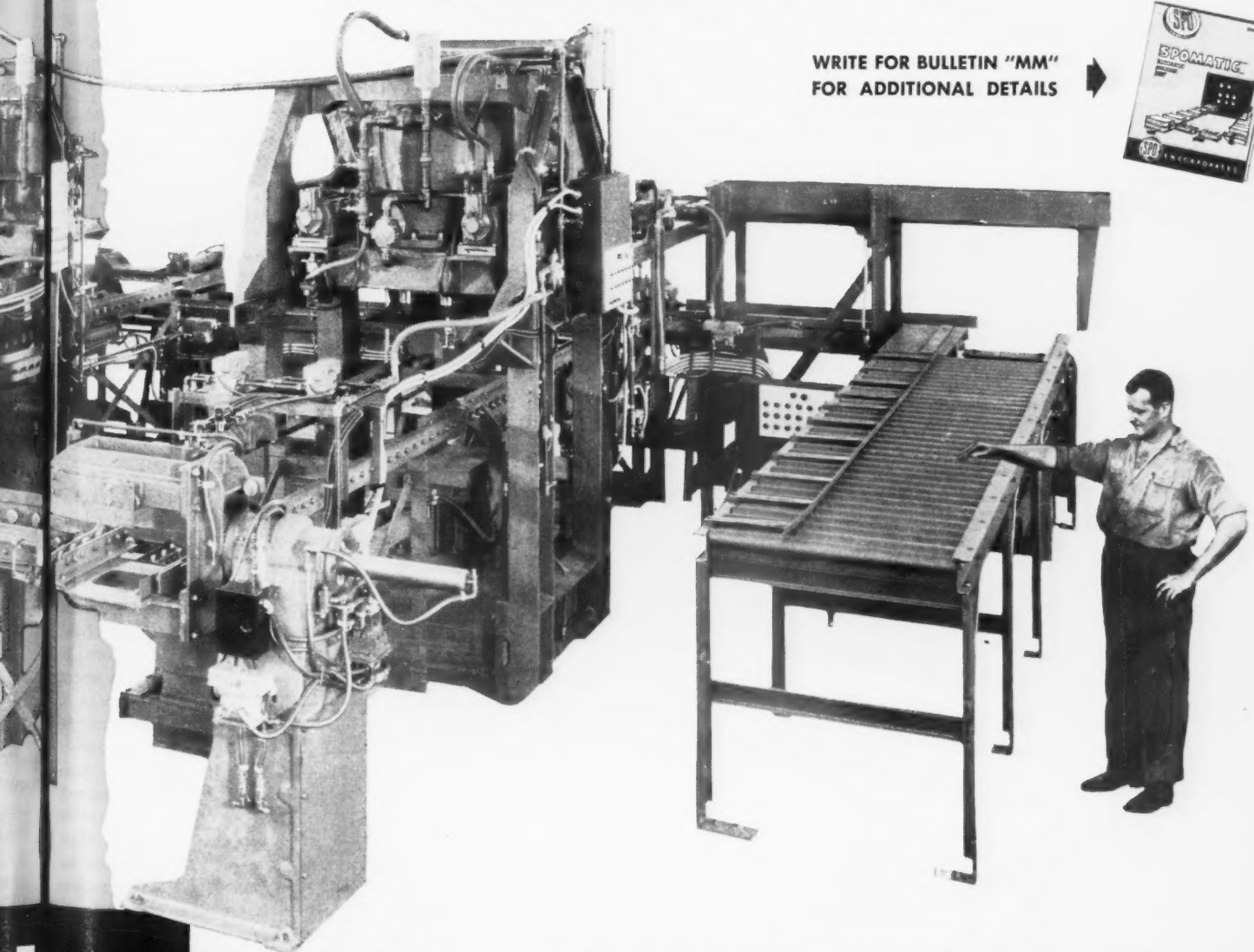
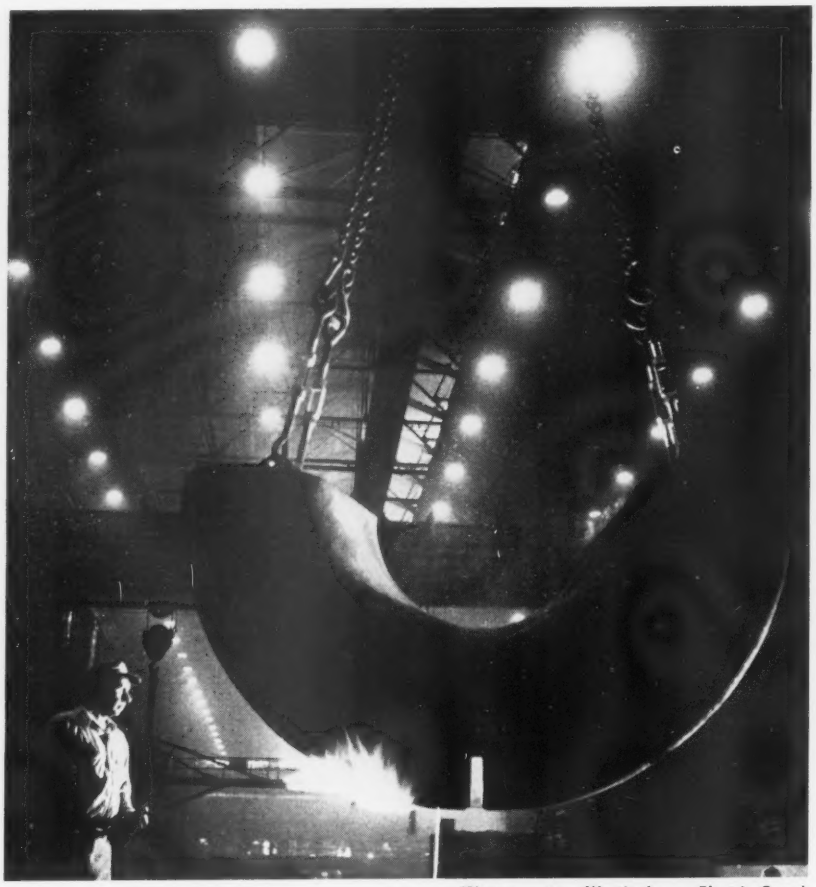


SPOMATIC . . . HEART OF THE AUTOMATIC FOUNDRY

1373-SI



(Photo courtesy Westinghouse Electric Corp.)

SEVEN-TON CORE: This huge core is for an 11-ton turbine cover casting used at the low-pressure end of a turbine. Made of a black-sand core mixture, the core is supported in the mold by anchors; the rests for these anchors are embedded in the core. Here an operator is flame drying a damp-sand filling that is used to cover the exposed anchor points

(*Concluded from page* 163)

of this character is unnecessary. While it is true the first iron melted usually is a little hard, due to the fact that the lower silicon iron melts first, that is not a sufficient reason for wasting it by allowing it to run into a pig bed under the spout. The iron should be kept in the cupola until the entire first charge has been melted. Then it will be found that the first iron tapped is satisfactory.

To insure a clean, hot tap hole for the first iron, the breast is made up in the usual manner. The tap hole remains open until just before the blower is started. A loose-fitting, dry sand core 4 to 6 in. long is inserted in the tap hole. It is daubed lightly with clay on the outer end to prevent iron from leaking through. The wind then is put on. By watching through the peep holes in the tuyeres it is a comparatively simple matter to decide when a sufficient quantity of iron is melted and ready to tap.

If melting conditions are uniform from day to day, the period may be timed so accurately that it becomes unnecessary to watch through the tuyeres; the iron may be tapped on a time schedule. While it is preferable to have a cupola tender competent to judge conditions for himself, it is not always possible to have a man of that kind on the job. In that event it is well to have a system so simple that it will fit in with the scope of the most untrained and limited intelligence.

Another commendable feature about the foregoing method for stopping the tap hole just before the wind goes on, is that frequently the cupola tender has many little details requiring attention at the last minute. If he has to stand by the spout for perhaps 20 minutes, first before the iron appears and then watching through the tuyere peep hole until it is time to tap, he cannot give these details his proper attention. Molten iron must be handled rapidly with a minimum of confusion and in a manner to prevent accidents. For that reason it is necessary to have everything moving smoothly and as nearly as possible automatically.

Any good clay will serve for botting the tap hole. It must not be too wet or sticky. Just enough water is added to make it nice and workable. Usually the clay may be used without any addition, but if it is too sticky it may be toned down with varying amounts of old molding sand, sawdust or coal dust. The object is to produce a material flexible and damp enough to fill and cling to the tap hole, then become friable enough so that it can be removed completely and easily with the tapping bar. Complete removal at each tap is absolutely essential.

The bott should be applied before the cupola well is empty and before the slag appears at the tap hole. Should a number of clay botts be pushed in succession into a messy combination of iron and slag, a mound is built up that is practically impossible to remove without dislodging the entire breast. A sledge hammer will be required to drive the tapping bar through the combination of slag, clay and iron. As a result the iron either dribbles through or freezes altogether in the extra long tap hole.

In applying the bott the stick should be held at an angle of about 30 degrees *above* the stream. The bott should never be allowed to get under the stream, because of the danger of splashing metal.

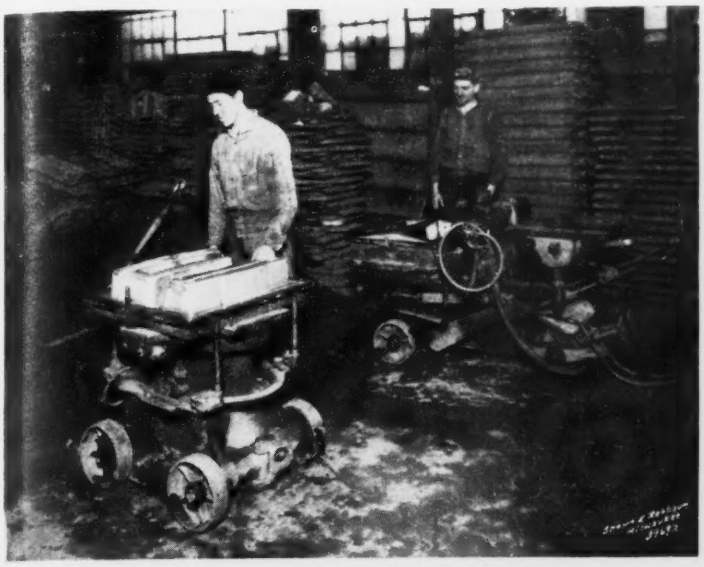
Battelle Establishes New Research Service

A new technological information service has been established at Battelle Memorial Institute, Columbus, O., to help reduce duplication of research effort by scientists and research organizations. With existing published knowledge being increased at an estimated rate of 60 million pages of technical matter each year, some authorities put the current annual cost of literature searching at $300 to $750 million, or from 10 to 25 per cent of the $3 billion spent in the nation last year on research.

To be tailored to individual needs, the service will include preparation of bibliographies and coding and classification systems. When it is required, the institute will develop information processing equipment. Battelle staff members assigned to the service include Dr. Robert C. McMaster, supervisor of electrical engineering research; Dr. Iver Igelsrud, technical librarian; Roger L. Merrill and Alvin T. Maierson.

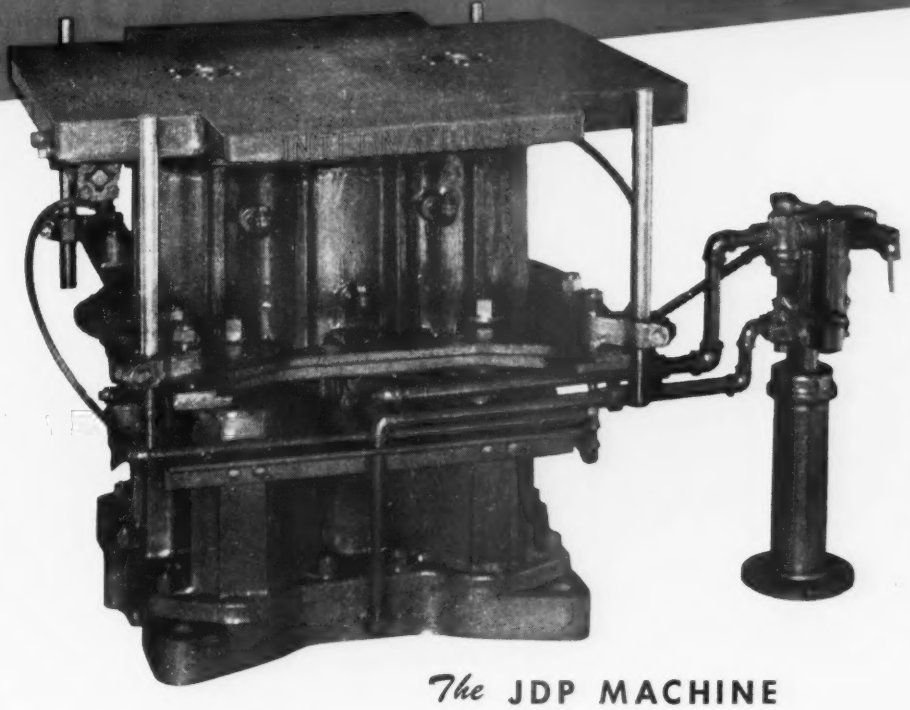
INTERNATIONAL TYPE

JDP MACHINE



The JDP has the exclusive Double Jolt Feature. A **Positive** Jolt and a **True** Ram.

TWO JOLT SECTIONS combined in one integral unit.



The JDP is adaptable to a large range of work, suitable to the pin lift style. It is readily adjustable. The incorporation of the Double Jolt Feature, combined with the sturdiness of the machine, gives a positive ram throughout the mold.

The lifting section is guided by hardened steel parts for long lasting wear. All valves are conveniently located for ease of operation. Wearing parts can be readily replaced.

The JDP MACHINE

by

INTERNATIONAL

International Molding Machine Company • La Grange Park, Illinois

Sterling WHEELBARROWS for Your Foundry!

No. D4S — Tubular reinforced frame barrow for sand, scrap, etc. 4 cu. ft. capacity. 14 ga. tray.

No. D6S — Same as No. D4S above, but with 6 cu. ft. capacity, for coal and coke. 14 gauge tray.

Any Type of Wheelbarrow .... Now Available for PROMPT SHIPMENT!

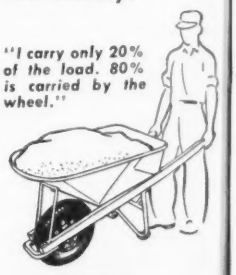
No. D8S — Tubular, reinforced frame barrow for coke, sawdust, shavings, and similar bulky materials. 14 ga. tray.

No. DF4S—Heavy duty barrow for extra hard foundry service. 3/16" plate supports front, back and bottom of tray. Tubular frame also reinforced. 14 gauge or 12 gauge tray.

Here's a simple way to solve your foundry hauling problems. Use Sterling Tubular Steel Handled Wheelbarrows or Barrows with wood handles made of select hardwood. They "fill the bill" . . . have long been known for their ability to withstand rough foundry usage . . . day after day . . . month after month. The all-welded Sterling tray is lapped at corners for double strength and is equipped with a continuous steel, butt-welded reinforcing rod around the top edge. And remember, Sterling Barrows are built by the same dependable manufacturer who has supplied you with Steel Foundry Flasks for almost a half century.

Choice of Wheels

Sterlings are available with Zero Pressure Cushion-type Wheel, Pneumatic-tired Wheel, or Plain Steel Wheel. All are interchangeable on any Sterling Barrow. Write for catalog.



"I carry only 20% of the load. 80% is carried by the wheel."

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Sterling

Pioneers in the Manufacture of Foundry Flasks

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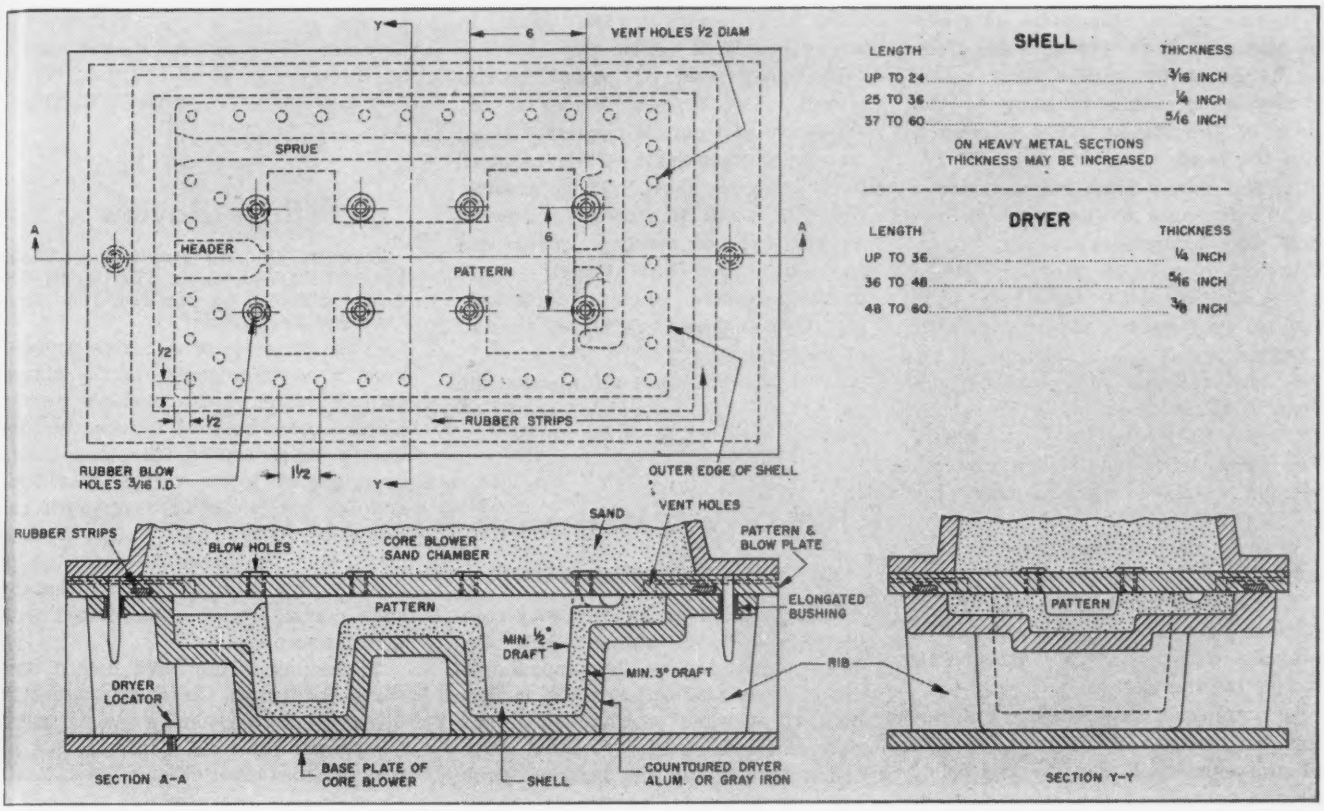

Sketch showing how shell mold is formed by core blower

Conventional Equipment Used in New Shell Molding Process

A NEW process for the forming of shell molds, to be called Dietert precision molding, has been under development for a number of months through the cooperative work of the Harry W. Dietert Co., Detroit, the Archer-Daniels-Midland Co., Cleveland, and Auto Specialties Mfg. Co., St. Joseph, Mich. The new process is interesting in that it utilizes normal foundry equipment and drying oil binders in the production of a form of shell mold.

Preliminary work indicates that either a bank sand or a washed and dried Ottawa-type sand may be employed. From 1 to 3 per cent (by weight) of a special oleoresinous binder is added to the perfectly dry sand. Amount of binder depends upon the type and fineness of dry sand used. Other sand additives may be incorporated in the mixture for elevated temperature properties. However, the fundamental formula of sand and oil cited above can be used by itself for this process.

Sand and binder are intimately blended in regular equipment, the mixture is placed in the hopper of a conventional blow machine, and the shell mold is blown on a contoured drier. This type of drier differs from the regular drier in that it is used to form the back of the shell mold as well as act as support for the mold itself. The drier is, of course, vented so that the sand can be packed adequately. Normal blow machine pressures are used.

The blown shell mold and drier are then placed in a conventional core-baking oven for curing. Time of curing is a function of the mass of sand in the core, its thickness, the type and grain-size of the sand, the amount of binder used, the weight and composition of the drier, and the load in the oven. Temperatures as high as 600° F may be used if the time cycle is short. A ½-in. shell baked on a drier about 1 in. thick should be cured thoroughly in about 40 minutes at 550° F when 2½ per cent binder is used with fine, dry bank sand.

After baking, the shells are removed from the driers, clamped together and poured. No special backing material is necessary since the thickness of the shell can be so adjusted to prevent the breaking through of the shell by the molten metal.

The following procedure may be used for experimental testing of the process:

1. Place 975 pounds of dry bank sand into a cleaned muller.
2. Run the muller a few seconds to distribute this fine sand over the base plate.
3. Slowly add 25 pounds of the special liquid binder to the sand. The binder weighs approximately 8 pounds per gallon at 77° F.
4. Mix the binder with the sand for a sufficient time to assure complete dispersal. No more than 10 minutes should be necessary.
5. Discharge the sand from the mixer and place it in the reservoir of the cleaned blow machine.
6. Make certain that the pattern surfaces were cleaned properly with solvent before attempting to make cores. Place the drier plate on the blow machine table, engage the machine and blow the shell mold.
7. Remove the shell mold and drier from the machine and bake the mold in the drier.

A few precautions are recommended when following this procedure:

1. The muller should be as clean as possible, both before and after discharge of the mixed sand. Any binder which tends to cling to the sides of the muller must be mixed into the sand.

2. The mixed sand can be stored in an open area without any protection for approximately 24 hours. However, if a longer storage time is necessary, a cloth dampened with fuel oil (*not* water) can be used as a covering.

3. Patterns must be cleaned thoroughly of oxidized oil before they are used with the mixture. Gasoline is an effective solvent for removing oxidized oil film from the pattern.

4. Blow machine lines must be free from water for best results.

5. The shell molds should be blown in as rapid succession as possible to prevent oxidation of the thin film of binder on the pattern surfaces.

A number of features are claimed for the process. Since the thickness of the core shell can be controlled by the contour of the drier, there is less danger of horizontal section breakthroughs when the shell is poured in a vertical position. Sand reinforcing ribs can be made integral with the back of the shell to strengthen it, if necessary.

Presently used equipment is employed. The type of binder is not expensive and only a relatively small amount is necessary. Time required for mixing is short. It is possible that the sand mixtures formulated for this type of molding process can be used in the conventional manner in the coreroom, since the fast baking dry sand mixture has a number of features.

It is claimed that all metals can be poured in this type of mold, including high-temperature alloys.

Film Depicts Magnesium and Aluminum Casting

Color motion picture recently completed for R. H. Osbrink Mfg. Co., Los Angeles, depicts the complex, precision parts made possible by modern methods of sand casting in magnesium and aluminum. Entitled "Precision Casting by the Osbrink Process," it presents advanced weight-saving design elements which are an outgrowth of the process.

The film is available for showing to engineering and management groups, schools and other interested agencies. Requests for its use should be directed to C. H. Butler, R. H. Osbrink Mfg. Co., 6917 McKinley Ave., Los Angeles 1.

Book Review

How to Control Production Costs, by Phil Carroll, cloth, 272 pages, 6 x 9 in., published by McGraw-Hill Book Co. New York. Price $5.

If the progress of America depends upon a continuing rise in the standard of living of the nation's people, as the author believes it does, then industry must try to turn out better products at lower prices. The first chapter of this book deals with the necessity for the control of production costs, and the other 25 describes in considerable detail the means whereby such control can be established with diversified products.

Timestudy is the most helpful tool for such control, the author says (he already has written a work called *Timestudy for Cost Control*), but he also stresses such other tools of management as engineering, production control, suggestion plans and quality control. The book is meant for all management men, not just for accountants.

How To Do It . . .

Split Chill Is Easy To Remove From Cold Gray Iron Wheel

By F. J. McCULLOCH
Yorkshire, England

DIFFICULTY in removing a chill placed in a sand mold to form the hub of a gray iron wheel and promote solidity within the central area of the casting may be overcome by splitting a solid steel tapered chill longitudinally and inserting an appropriately shaped piece of asbestos paper between the half sections. To hold the sections together, a piece of gummed paper is stuck around the chill halves. The assembly is coated with plumbago wash and dried thoroughly before being placed in the mold.

When the mold is filled with molten metal the paper burns off, leaving the chill supported in the coreprints. The split chill, due to the presence of the asbestos paper, is slightly compressible during the time the casting is contracting, and, in consequence, easily is pushed out of the casting with the fingers when the casting is cold. Furthermore, little damage is done to the chill surface by the hot metal.

Previously a one-piece chill turned from mild steel rod, and having a taper of two degrees along the section which came in contact with the casting, was used. Despite the liberal taper allowance and the plumbago coating, difficulty was experienced in removing it from the cold casting. That difficulty was attributed to the fact that as the molten metal solidified and shrunk, the casting tightened its grip on the chill. The tightening brought the hot metal into intimate contact with the chill, creating a favorable condition for fusion to take place.

Use of the split chill eliminated difficulty in removing it from the casting.

EDITORS' NOTE: This item was abstracted from *Foundry Practice*, house organ published by Foundry Services Ltd., Birmingham, England.

Do you have any tricks of the trade tucked away with your foundry experience? Why not release them to fellow foundrymen? FOUNDRY will pay a minimum of $10 for each idea submitted and published. Send a photo or drawing with your idea

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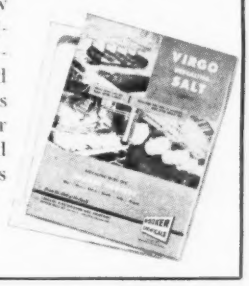

NEW, FAST *DESANDING, DEGRAPHITIZING* PROCESS

Saves You Up to 300 Hours per Month!

You can desand and degraphitize iron and steel castings in 10 minutes—or less—with Virgo Molten Cleaner.

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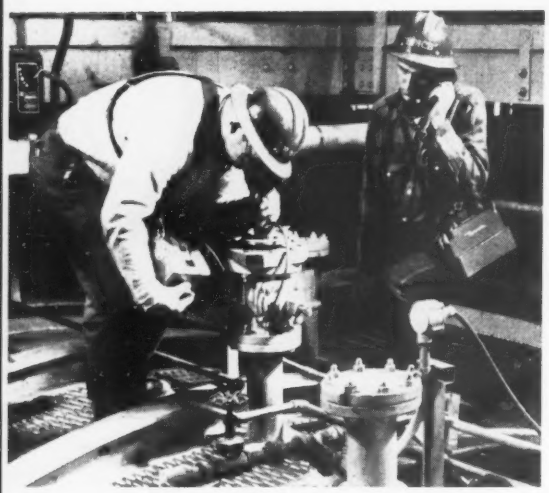
Main bay of one of three electric furnace buildings at new plant of Electro Metallurgical Co.

Molten alloy, melted in large submerged-arc furnaces, being poured into chills for solidification



Furnace operator taking temperature readings at furnace. Radio is used to relay readings to control room

Product and Process Developments Mark

NEW ALLOYS PLANT

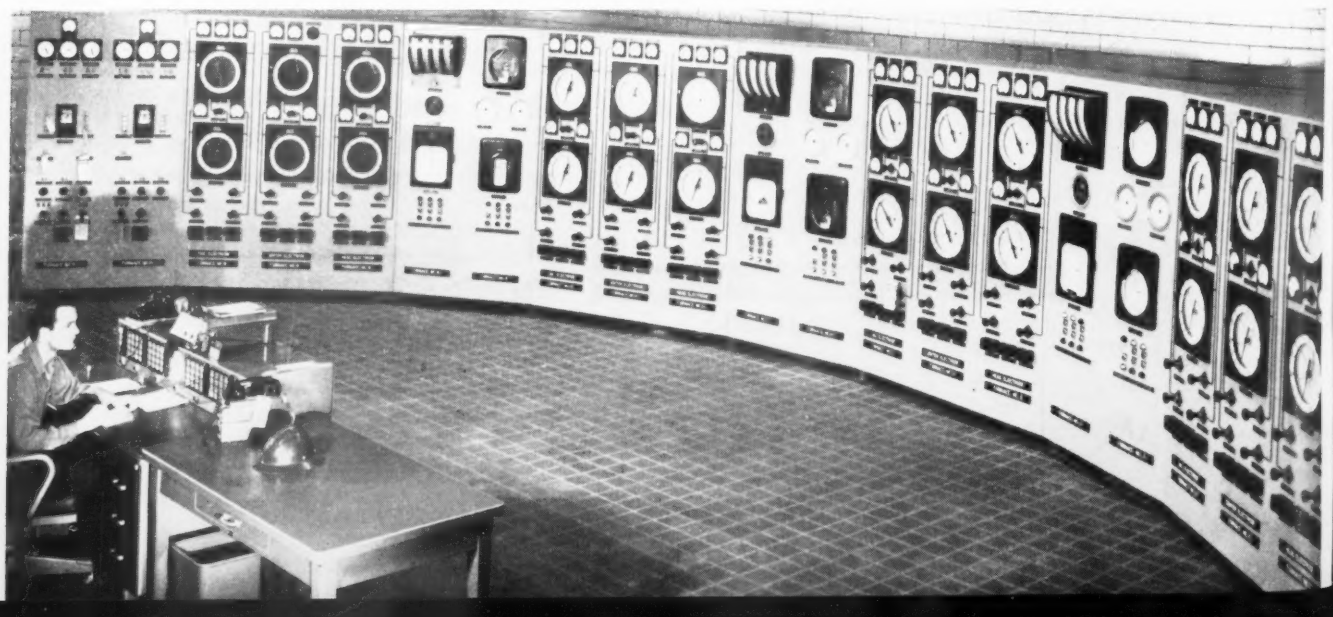
NEW developments in alloying materials and in methods of producing them stem from the huge new plant being built at Marietta, O., by the Electro Metallurgical Co., a division of Union Carbide & Carbon Corp.

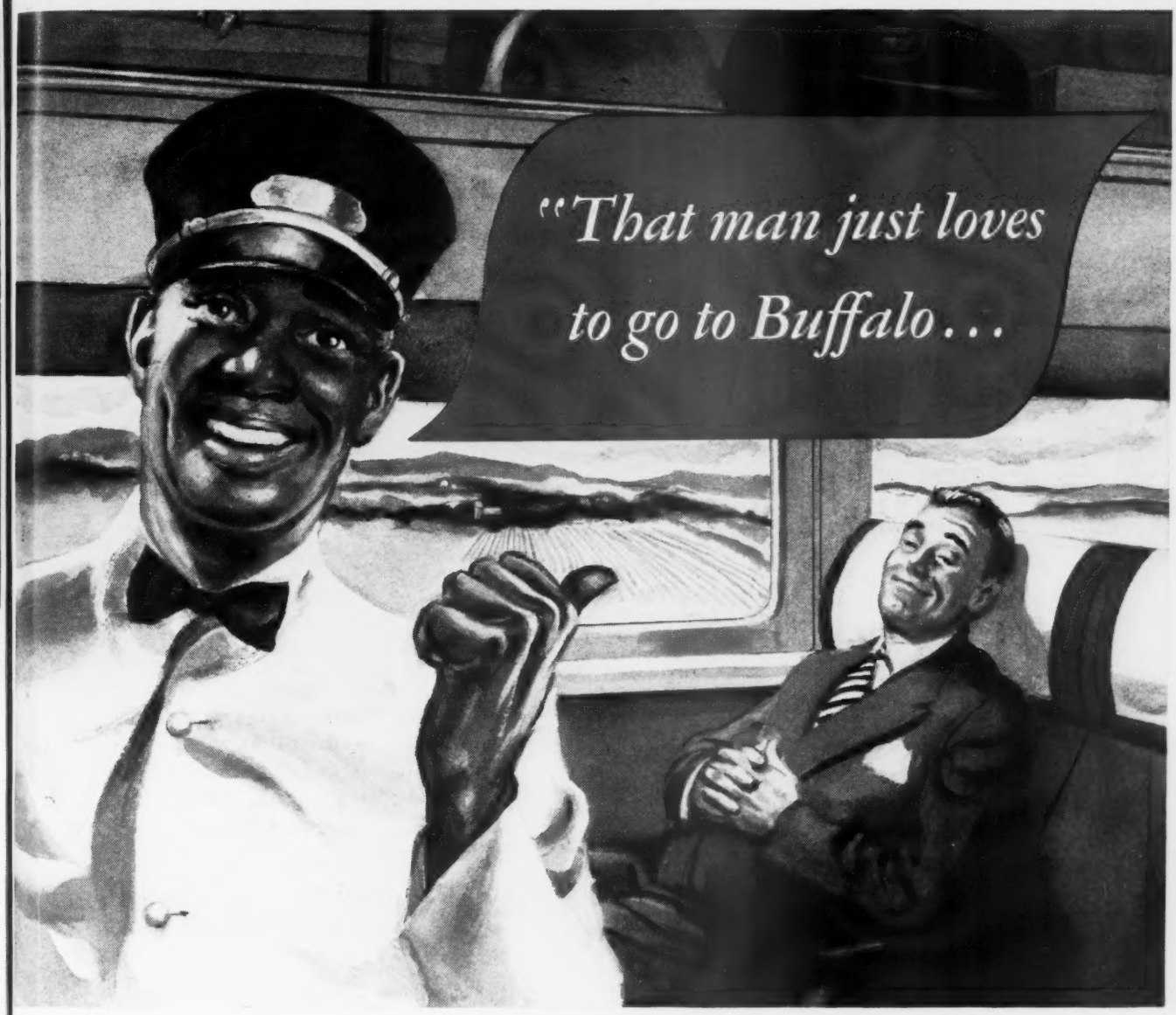
The installation comprises about 20 buildings on a 750-acre site. Most of the plant now is in commercial production, and final construction is expected to be completed next spring. Bulk of the output consists of standard grades of ferrochrome, ferrosilicon, ferromanganese and silicomanganese for the steel and foundry industries.

Of particular interest among the plant's products is a new low-carbon ferrochrome for making stainless steel. Known as Simplex ferrochrome, it can be made with carbon content as low as 0.01 per cent. Be-

(*Concluded on page* 178)

Central control room in building where low-carbon ferrochrome is produced





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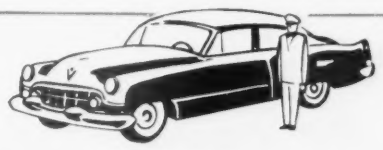
Yes, busy foundry men come back to Buffalo again and again for their patterns. There's a good reason for this, and it's pretty close to their pocketbooks and their peace of mind.

Here, they have learned by experience, is the type of engineering that *minutely* plans every detail of every job and the kind of craftsmanship that *precisely* follows through on these plans. They also know that there is NEVER any adapting or extra rigging to do on a Buffalo Pattern. Buffalo equipment always fits their foundry and production schedules like a tailor-made coat. That gives them real peace of mind. Once they get into production, they know that a Buffalo Pattern will deliver a real profit-plus, because their scrap ratio will be at an unbelievable low. After one experience, you'll "love" to come to Buffalo, too! Why not try it?

BE OUR GUEST

Just let us know when you are coming to Buffalo on pattern business. One of our cars will meet you at your plane or train and transport you to our club where you will be our guest during your stay.



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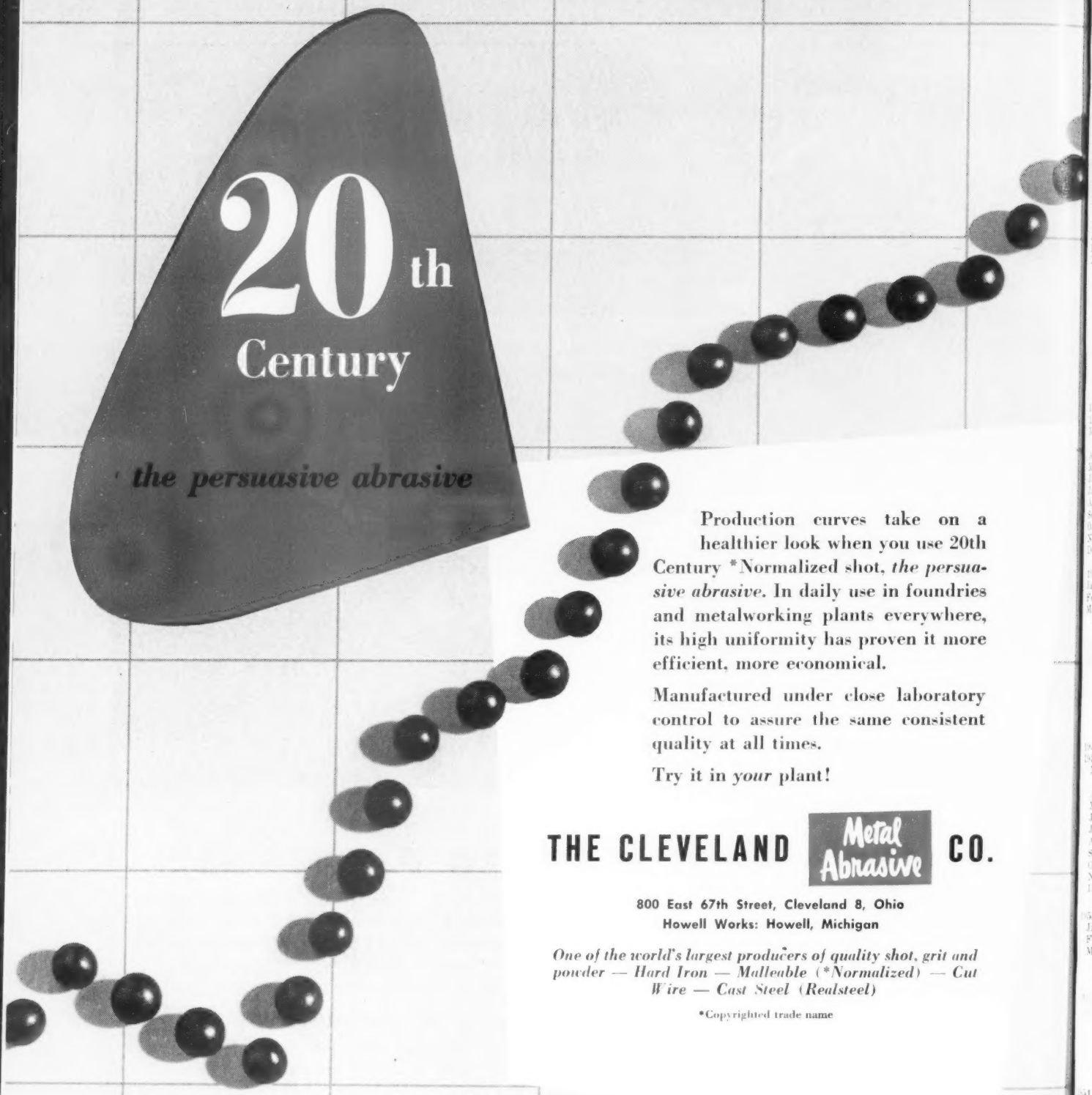

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Foundry Statistics

Malleable Iron

(Shipments of castings—net tons[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1951	1,085,241	656,076	.....
1952			
Mar.	80,960	49,084	196,896
3 mo.	250,861	154,201	.....
Apr.	89,270	56,337	198,215
May	81,770	51,476	180,382
June	74,446	46,511	173,353
July	45,266	29,675	166,517
Aug.	63,716	39,308	162,832
Sept.	75,950	45,849	168,367
Oct.	88,062	52,922	168,609
Nov.	76,099	46,708	167,842
Dec.	80,680	50,485	173,494
Total	926,120	573,472	.....
1953			
Jan.	87,249	53,272	174,809
Feb.	86,515	51,963	175,088
Mar.	94,481	57,025	177,776
3 mo.	268,245	162,260	.....

Copper-Base Alloy

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—Sand	Shipments—Perm. Mold	Unfilled Orders[2]
1951	1,177,541	1,056,226	69,943	.....
1952[3]				
Mar.	90,217	80,857	6,229	72,463
3 mo.	268,653	241,427	17,805	.....
Apr.	85,958	76,947	5,949	70,602
May	83,401	75,072	5,458	70,252
June	76,768	69,014	4,906	70,797
July	66,177	60,249	3,669	74,739
Aug.	78,798	71,273	5,154	73,928
Sept.	85,815	78,278	4,680	89,034
Oct.	93,102	84,544	5,518	86,779
Nov.	80,439	72,281	5,011	82,393
Dec.	90,799	81,777	5,715	76,871
Total	1,009,910	910,862	63,865	.....
1953[3]				
Jan.	85,781	76,686	5,388	80,793
Feb.	85,183	76,847	5,061	76,578
Mar.	92,773	83,623	5,713	69,455
3 mo.	263,737	237,156	16,162	.....

Aluminum

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—Sand	Shipments—Perm. Mold	Shipments—Die	Unfilled Orders[2]
1951	550,433	206,671	172,729	157,756	.....
1952[3]					
Mar.	41,436	16,785	11,923	12,040	104,749
3 mo.	121,688	48,492	34,568	36,784	.....
Apr.	43,971	17,048	12,678	13,390	104,004
May	42,094	15,984	12,297	12,717	100,802
June	39,867	15,989	10,255	12,657	103,685
July	35,275	14,014	9,232	11,302	106,673
Aug.	39,197	15,834	10,493	11,730	112,852
Sept.	45,430	16,733	12,515	15,888	127,777
Oct.	51,631	17,826	15,191	18,284	132,624
Nov.	46,483	15,419	13,463	17,372	138,461
Dec.	53,343	17,277	16,191	19,608	146,499
Total	518,979	194,616	146,883	169,732	.....
1953[3]					
Jan.	55,629	19,158	16,147	20,052	142,542
Feb.	54,864	17,583	16,698	20,272	148,557
Mar.	59,424	18,990	17,865	22,255	145,749
3 mo.	169,917	55,731	50,710	62,579	.....

Magnesium

(Shipments of castings—1000 pounds[1])

	Shipments—Total	Shipments—For Sale	Unfilled Orders[2]
1951	33,135	28,596	.....
1952[3]			
Mar.	3,040	2,882	13,279
3 mo.	9,335	8,736	.....
Apr.	2,793	2,662	13,244
May	2,734	2,607	13,041
June	2,703	2,603	12,094
July	2,405	2,303	12,948
Aug.	2,478	2,390	13,178
Sept.	3,090	2,949	16,833
Oct.	3,250	3,070	16,237
Nov.	2,959	2,785	17,053
Dec.	3,110	2,872	16,020
Total	34,857	32,977	.....
1953[3]			
Jan.	3,073	2,825	15,680
Feb.	3,225	3,033	14,834
Mar.	3,362	3,093	13,608
3 mo.	9,660	8,951	.....

Foundry Production Workers

Estimated Number

	Feb. 1953	Jan. 1953	Feb. 1952
Ferrous	225,200	226,100	229,600
Nonferrous	82,800	82,100	73,200

Average Weekly Earnings

Gray Iron	$73.93	$72.32	$68.62
Malleable Iron	77.27	75.52	70.15
Steel	82.74	81.51	76.58
Nonferrous	81.67	82.41	77.83

Average Weekly Hours

Gray Iron	40.4	40.4	40.2
Malleable Iron	41.1	40.6	39.7
Steel	42.0	41.8	42.9
Nonferrous	42.1	42.7	42.3

Labor Turnover Rate (Feb.)

(Per 100 employees)

	Total Accession	Total Separation	Quit	Layoff
Gray Iron	4.1	4.4	2.3	1.4
Malleable Iron	4.3	3.9	2.5	0.6
Steel	4.4	4.6	2.8	1.0
Nonferrous	5.2	4.4	2.8	0.6

Source: Bureau of Labor Statistics

Gray Iron Castings—Shipments

(net tons[1])

	All Castings—Total	All Castings—For Sale	Miscellaneous Castings—Total	Miscellaneous Castings—For Sale	Heavy Steel Ingot Molds—Total	Heavy Steel Ingot Molds—For Sale	Chilled Railroad Car Wheels—Total	Pressure Pipe & Fittings—Total[4]	Soil Pipe & Fittings—Total[4]	Unfilled Orders[2]
1951	14,988,555	8,453,048	9,573,347	4,471,539	2,614,517	1,257,542	639,996	1,473,192	687,503	.....
1952										
Mar.	1,172,017	665,092	723,225	334,492	228,799	110,607	53,919	115,843	50,231	1,711,037
3 mo.	3,526,445	2,020,822	2,201,840	1,043,183	673,754	326,788	161,518	349,241	134,573	.....
Apr.	1,204,801	658,818	773,538	347,121	204,805	85,239	48,506	117,929	60,023	1,614,426
May	1,100,630	624,430	698,332	317,150	186,998	91,980	44,229	117,586	53,485	1,459,305
June	835,263	502,322	616,895	292,846	19,467	10,575	44,066	103,335	51,500	1,445,521
July	636,423	431,889	407,757	227,794	14,794	10,223	40,783	96,784	56,305	1,409,684
Aug.	1,001,629	602,025	596,369	295,861	198,856	99,760	35,606	108,313	62,485	1,513,166
Sept.	1,119,373	629,708	676,732	309,299	230,219	107,987	39,912	107,847	64,663	1,450,723
Oct.	1,233,480	688,837	759,131	340,695	243,462	117,255	45,664	117,089	68,134	1,391,609
Nov.	1,060,735	593,779	649,316	296,674	218,349	104,035	41,655	99,196	52,219	1,309,252
Dec.	1,141,658	619,070	713,332	321,939	247,605	116,410	42,957	95,198	42,566	1,316,308
Total	12,860,437	7,371,700	8,113,242	3,792,562	2,238,309	1,070,252	544,896	1,312,518	651,472	.....
1953										
Jan.	1,161,945	622,392	730,216	324,330	252,181	118,514	38,385	93,930	47,233	1,333,255
Feb.	1,135,868	607,160	721,847	315,101	228,360	106,398	44,420	93,152	48,089	1,332,038
Mar.	1,264,271	674,720	800,390	341,656	250,447	119,630	41,414	114,885	57,135	1,375,886
3 mo.	3,562,084	1,904,272	2,252,453	891,087	730,988	344,542	124,219	301,967	152,457	.....

Steel Castings—Shipments

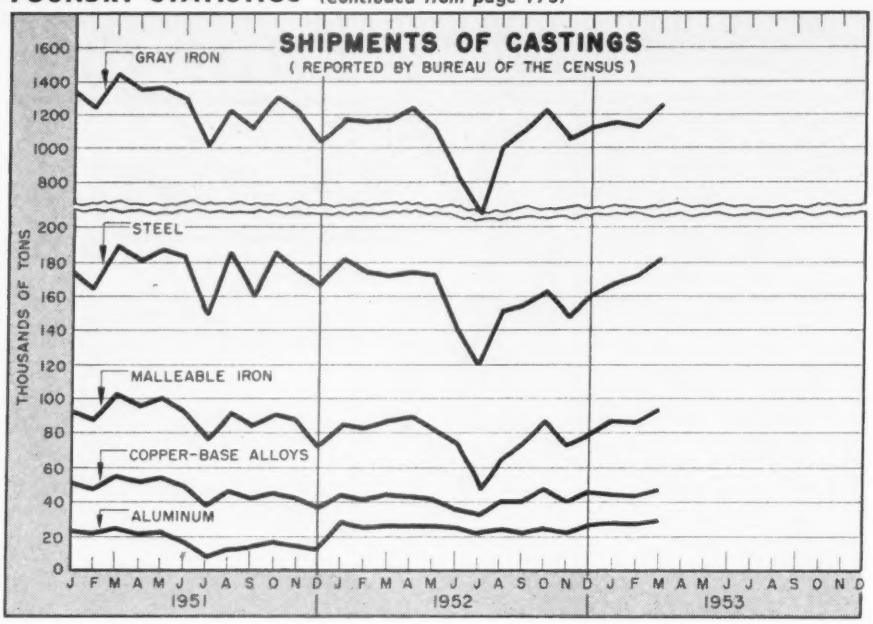
(Net tons[1])

	All Castings—Total	All Castings—For Sale	All Castings—Railway Specialties	Carbon Steel—Total	Carbon Steel—For Sale	Carbon Steel—Railway Specialties	Alloy Steel—Total	Alloy Steel—For Sale	Alloy Steel—Railway Specialties	Unfilled Orders[2]
1951	2,050,054	1,506,903	466,172	1,541,280	1,162,687	415,915	508,574	344,216	50,157	.....
1952										
Mar.	173,694	131,997	32,118	125,787	95,206	27,782	47,907	37,196	4,336	857,115
3 mo.	532,058	405,087	100,928	385,256	293,056	87,839	146,802	113,273	13,089	.....
Apr.	175,075	134,325	33,549	126,628	97,128	29,798	48,447	37,654	3,751	842,970
May	173,635	132,129	35,227	125,309	95,816	30,995	48,326	37,129	4,232	804,695
June	141,628	114,410	30,455	101,850	84,388	26,815	39,778	30,818	3,640	846,459
July	119,036	97,633	20,752	81,576	67,600	18,694	37,460	30,329	2,058	855,046
Aug.	150,232	113,997	24,498	107,203	81,123	21,626	43,029	33,359	2,872	809,354
Sept.	158,392	121,402	20,686	109,011	82,968	17,843	49,381	39,190	2,843	781,929
Oct.	165,155	124,626	23,590	116,201	87,035	20,611	48,954	38,571	2,979	772,949
Nov.	148,259	110,467	23,148	105,314	77,979	20,681	42,945	33,349	2,467	751,687
Dec.	161,733	122,166	26,728	114,146	86,165	24,046	47,587	36,757	2,682	719,203
Total	1,925,203	1,476,242	339,561	1,372,494	1,053,264	298,948	552,709	430,429	40,613	.....
1953										
Jan.	167,211	126,819	27,150	118,423	118,423	24,788	48,788	38,121	2,362	706,490
Feb.	175,675	137,592	33,156	122,624	94,991	29,828	53,051	43,495	3,328	644,302
Mar.	182,181	141,873	34,364	129,055	100,069	31,772	53,126	42,286	2,592	634,600
3 mo.	525,067	406,284	94,670	370,102	313,483	86,388	154,965	123,902	8,282	.....

[1] Source: Bureau of Census. [2] For sale only. [3] Based on new sampling method; not comparable to prior figures. [4] All cast iron pipe is shipped for sale.

(Concluded on page 176)

FOUNDRY STATISTICS (Concluded from page 175)



Index of Foundry Equipment Orders

Foundry Trades Only

(Net Orders Closed, New Equipment)

	1952	1953
Jan.	404.5	301.0
Feb.	200.4	257.3
Mar.	310.0	396.7
Apr.	385.1	303.0
May	225.2	....
June	353.8	....
July	343.9	....
Aug.	311.6	....
[illegible]	36[illegible]	....
Oct.	335.8	....
Nov.	258.1	....
Dec.	343.3	....

Note: Figures are percentages of the base period 1937-1939 taken as 100 per cent (monthly average). Source: Foundry Equipment Manufacturers Association.

Coke Production and Consumption

(Net tons)

	Production	Consumption Total	Consumption By Foundries
1951	79,133,744	78,868,124	3,664,404
1952			
Apr.	5,805,453	5,770,711	261,972
4 mo.	25,739,681	25,354,532	1,025,370
May	5,961,757	5,882,713	253,605
June	2,472,940	1,772,203	219,909
July	2,376,019	1,621,308	166,377
Aug.	6,039,749	6,204,539	232,249
Sept.	6,180,804	6,517,682	269,029
Oct.	6,449,519	6,792,273	276,427
Nov.	6,316,660	6,418,639	252,805
Dec.	6,690,649	6,981,036	246,107
Total	68,227,778	67,876,964	2,955,241
1953			
Jan.	6,767,814	6,884,585	248,557
Feb.	6,132,084	6,263,083	237,670
Mar.	6,835,310	6,875,568	275,442
Apr.	6,536,188	6,531,980	272,189
4 mo.	26,271,396	26,555,216	1,033,858

Ingot Brass & Bronze

(Shipments in net tons)

	1952	1953
Jan.	28,315	24,423
Feb.	24,211	25,429
Mar.	23,890	28,256
Apr.	22,547	25,044
May	21,740	.....
June	21,274	.....
July	18,947	.....
Aug.	21,807	.....
Sept.	22,770	.....
Oct.	25,811	.....
Nov.	23,441	.....
Dec.	22,983	.....
Total for year	277,736	.....

Zinc-Base Alloy

(Shipments of castings—1000 pounds[1])

	Shipments—Totals	Shipments—For Sale	Unfilled Orders[2]
1951	494,950	328,183	.....
1952[3]			
Mar.	33,264	23,363	67,846
3 mo.	102,112	71,288	....
Apr.	35,008	23,640	63,753
May	33,325	22,246	62,397
June	31,449	21,255	60,719
12 mo.	408,353	282,673	.....
1953[3]			
Jan.	45,941	30,702	88,440
Feb.	46,583	31,761	91,800
Mar.	51,673	35,460	90,266
3 mo.	144,197	97,923	.....

Pig Iron Production and Consumption

	Production** (Standard grades—1000 net tons) Total	Foundry	Malleable	Basic	Low Phos., Intermediate Low Phos. & Bessemer	Consumption* (By type of furnace, 1000 gross tons) Total	Cupola	Air	Electric
1951	70,264.5	3,186.2	3,169.0	55,134.1	8,774.8	63,760	5,731	354	136
1952									
Mar.	6,226.2	250.3	273.1	4,895.9	806.9	5,552	433	27	7
Apr.	5,170.0	243.8	218.5	4,069.9	638.0	4,714	446	28	8
4 mo.	23,057.3	972.4	1,038.8	18,135.0	2,876.3	20,857	1,786	113	40
May	5,414.2	245.4	236.0	4,295.6	637.2	4,823	412	25	8
June	1,043.2	133.7	103.1	758.6	47.7	991	342	20	5
July	981.6	119.7	118.3	712.9	30.7	845	250	12	8
Aug.	5,767.3	262.9	280.6	4,553.8	669.9	5,063	423	9	8
Sept.	6,069.3	294.7	306.6	4,757.0	710.9	5,363	417	21	9
Oct.	6,415.3	280.0	299.4	5,091.6	744.2	5,812	463	24	9
Nov.	6,138.9	262.0	315.4	4,842.6	718.8	5,472	397	21	12
Dec.	6,414.7	293.4	315.1	5,106.9	699.2	5,685	419	24	14
Total	61,306.8	2,864.2	3,013.3	48,254.0	7,174.9	54,911	4,909	269	113
1953									
Jan.	6,470.6	274.9	285.5	5,201.5	708.8	5,784	425	24	12
Feb.	5,802.6	187.0	294.6	3,640.7	680.3	5,027	418	24	14
Mar.	6,601.1	263.9	358.1	5,256.1	723.0	....	....	....	....
Apr.	6,161.6	244.7	327.1	4,885.6	704.2	....	....	....	....
4 mo.	25.035.9	970.5	1,265.3	19,983.9	2,816.3	....	....	....	....

Iron and Steel Scrap Consumption

(Gross tons*)

	All Scrap—Total	All Scrap—Purchased	By Types of Furnace: Cupola—Total	Cupola—Purchased	Air—Total	Air—Purchased	Electric—Total	Electric—Purchased
1951	68,518,208	33,822,431	11,090,607	5,878,939	1,203,740	441,099	8,391,919	5,389,005
1952								
Feb.	5,572,506	2,702,092	789,293	419,279	94,900	35,536	697,319	440,325
2 mo.	11,419,517	5,490,518	1,636,184	869,214	196,111	73,686	1,440,552	910,451
Mar.	5,902,529	2,860,364	791,165	415,853	92,751	35,013	741,793	475,161
Apr.	5,360,417	2,657,926	834,066	440,035	106,059	38,888	684,318	427,339
May	5,369,258	2,660,471	779,436	404,899	94,597	35,966	700,617	455,460
June	2,048,951	1,169,102	719,739	374,127	82,357	30,412	285,596	173,740
July	1,965,007	1,156,296	524,651	278,750	52,999	19,733	364,536	244,944
Aug.	5,470,696	2,738,593	721,255	348,181	74,351	28,091	682,405	446,545
Sept.	5,782,986	2,862,994	760,092	389,910	82,212	30,493	761,795	501,602
Oct.	6,256,031	3,066,041	851,458	439,401	98,947	37,743	814,565	546,189
Nov.	5,960,435	2,885,008	731,825	379,950	80,228	30,502	780,042	518,320
Dec.	6,089,722	2,973,633	804,275	412,177	92,621	35,064	758,845	491,084
Total	61,625,549	30,520,946	9,154,146	4,752,497	1,053,233	395,591	8,015,064	5,190,833
1953								
Jan.	6,256,718	3,061,551	810,254	413,971	95,430	35,695	795,292	517,962
Feb.	5,802,854	2,817,896	818,375	422,306	92,371	35,234	745,179	478,486
2 mo.	12,059,572	5,879,447	1,628,629	836,271	187,803	70,929	1,540,471	996,449

*Source: U. S. Dept. of Interior. Bureau of Mines. **Source: American Iron & Steel Institute. [1]Source: Bureau of the Census. [2]For sale only. [3]Based on new sampling method: not comparable to prior figures.

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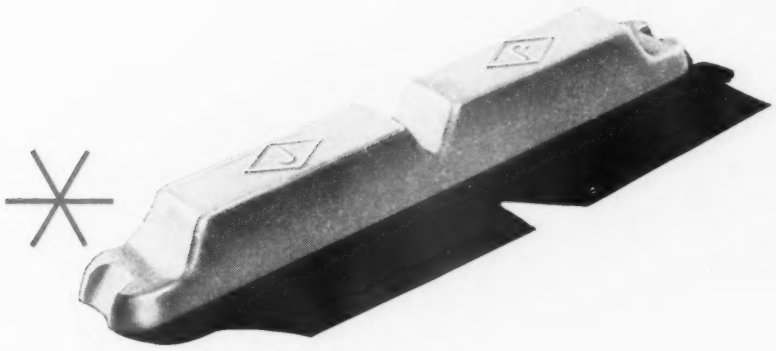

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(*Concluded from page* 172)

cause carbon content of stainless steel limits its corrosion resistance in certain applications, a low-carbon ferrochrome is desirable. The process that produces the new alloy is the result of ten years of research costing over $2 million.

Other products of the plant will include practically pure chromium and manganese. The former will be used in making special high-temperature metals for jet engines and rockets, the latter for some of the new stainless steels developed for structural purposes. Two new electrolytic processes will be employed to make the pure chromium and manganese.

Bigness characterizes the Marietta operations. The power plant, one of the largest industrial plants of its type in the country, can produce 200,000 kw of electricity. The alloy plant mix house, which handles the ores and other raw materials, is a quarter of a mile long. It is connected by inclined tramways to three large furnace buildings, one of which is not yet completed. There the raw materials are smelted in huge submerged-arc electric furnaces, of which there eventually will be 14.

The furnaces, operating 24 hours a day, are charged at the top, and the molten alloy is drawn off on the main operating level. Molten metal is cooled and solidified in chills, and then is cleaned, crushed and sized.

A separate building, covering 7½ acres under one roof, is used to produce the low-carbon ferrochrome. It receives high-carbon ferrochrome as its raw material. This is crushed to a fine powder, mixed with a binder, pelletized to about the size of walnuts and dried. The pellets, a million to a charge, then are "baked" in special electric furnaces to reduce the carbon. Mechanical handling is employed extensively in this building, and the broad expanse of the structure has prompted the use of Walkie-Talkie sets for communication between furnace operators and the central control room.

The new plant is unusual in appearance. All of the major buildings are constructed of white concrete slabs. Over a million square feet of concrete siding was used for the large sandwich panels that form the exterior walls. These panels, which are light and easily installed, are composed of two thin layers of precast concrete with a core of insulating material between them. Liberal use also was made of stainless steel. Over 2 acres of stainless sheeting covers the roof of one of the electric furnace buildings, and over 14,000 sq ft of window sash on the power plant is framed and trimmed with stainless steel.

The Marietta plant is part of a big alloys expansion program by the Electro Metallurgical Co. By the end of this year its alloy-producing capacity will be triple what it was in 1940.

Metal Cleaning Abstracts

American Society for Testing Materials, 1916 Race St., Philadelphia 3, just has published a 132-page booklet entitled *Metal Cleaning Biographical Abstracts* 1842-1951 which contains over 1000 annotated references to the literature on metal cleaning. References are arranged by year, by author or by journal, if anonymous, and numbered consecutively. Index is by subject, author, specification and patent. Price of the booklet is $4.25.

Book Review

Equipment for the Thermal Treatment of Non-Ferrous Metals and Alloys, a symposium, cloth, 104 pages, 8½ x 11 in., published by the Institute of Metals, London. Price $2.50.

Number 14 in the institute's Monograph and Report Series, this volume consists of a symposium on the metallurgical aspects of the subject announced in the title. There are seven papers, including "Electric Furnaces for the Thermal Treatment of Non-Ferrous Metals and Alloys," "Gas Equipment for the Thermal Treatment of Non-Ferrous Metals and Alloys," "Batch and Continuous Annealing of Copper and Copper Alloys," "Bright Annealing of Nickel and Its Alloys," "Batch Thermal Treatment of Light Alloys," "Flash Annealing of Light Alloys" and "Continuous Heat Treatment of Aluminum Alloys of the Duralumin Type." A section is devoted to general discussion, and subject and name indexes are provided.

Meetings of Interest to Foundrymen

Sept. 16-18 — National Foundry Association, annual meeting, Plaza Hotel, New York

Sept. 17-18—Niagara Frontier Regional Foundry Conference, sponsored by Western New York, Ontario, Northwestern Pennsylvania, Rochester, Central New York and Eastern New York Chapters of the AFS, Buffalo.

Sept. 19-26 — International Committee of Foundry Technical Associations, annual foundry congress, Paris, France

Sept. 21-22—Steel Founders' Society, fall meeting, Homestead, Hot Springs, Va.

Sept. 21-25—Instrument Society of America, national congress and exhibit, Sherman Hotel, Chicago

Sept. 24-25 — Ohio Regional Foundry Conference, sponsored by University of Cincinnati and Ohio AFS Chapters, Cincinnati

Sept. 25—Malleable Founders' Society, annual fall meeting, Cleveland Hotel, Cleveland

Oct. 8-9—Gray Iron Founders' Society, annual meeting, New Hotel Jefferson, St. Louis

Oct. 8-9—Michigan Regional Foundry Conference, Kellogg Center, Michigan State College, East Lansing, Mich.

Oct. 15-17—Foundry Equipment Manuacturers' Association, annual meeting, Greenbrier, White Sulphur Springs, W. Va.

Oct. 16-17—Northwest Regional Foundry Conference, sponsored by Oregon, Washington and British Columbia Chapters, AFS, New Washington Hotel, Seattle

Oct. 19-23—American Society for Metals, national metal congress and exposition, Public Auditorium, Cleveland

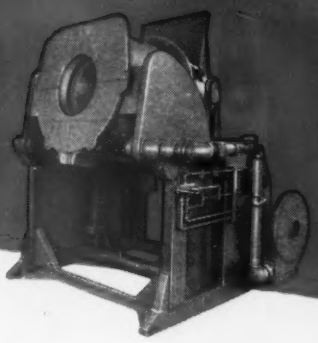
Oct. 29-30—Metal Castings Conference, sponsored by Purdue University, Michiana and Central Indiana AFS chapters, Purdue University, West Lafayette, Ind.

Nov. 4-6—Steel Founders' Society, T & O Conference, Carter Hotel, Cleveland

1954

Mar. 15-19—National Association of Corrosion Engineers, tenth annual conference and exhibition, Kansas City

May 10-14—American Foundrymen's Society, annual convention and exhibition, Public Auditorium, Cleveland



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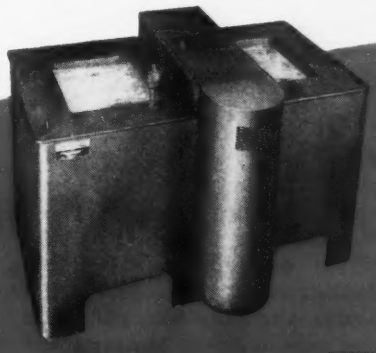

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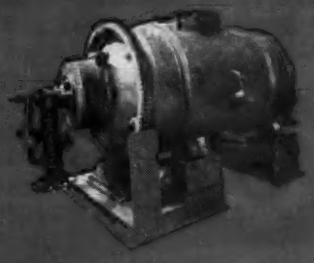
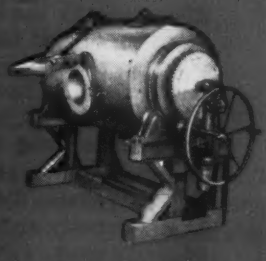
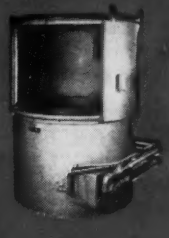
- bronze
- brass
- yellow brass
- red brass
- tin
- zinc
- lead
- babbitt
- type metal
- gold precipitates
- silver precipitates







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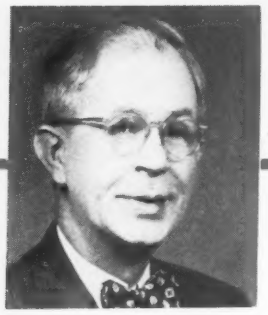


Man-to-Man

By RALPH L. LEE

Sand Testing at the Lee Foundry

The difference in results between no testing and the amount that any foundry can afford is too great for checking to be neglected entirely

FOR some five or six years now, the Lee Hobby Foundry has been all set up to make moisture tests on sand. The equipment has been a small chemical balance (made, I think, for amateur photographers who do their own developing), an electric heater originally belonging with a coffee percolater of Mother's and a little tin pan that is a screw top off a wide-mouthed glass jar.

After considerable experimenting and calibrating, I worked out a curve so that I could weigh the sand before and after drying and convert the difference into percentage of moisture. As I remember, several sand sessions at chapter meetings of the AFS sort of shamed me into giving up the hand feel test I'd been using up to that time.

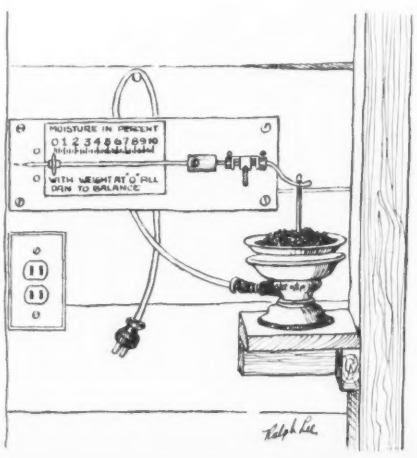
For a while after my scientific testing procedure had been set up, I checked every batch of sand and made notes in my log book. In fact, I got such a bang out of running tests that sometimes I'd run on up there to the foundry and make me a couple of tests just for the heck of it. Testing and curve plotting can get the best of you.

Of course, the funny thing about it was that I didn't know just how many pounds of sand were in the heap. When my test showed the sand to be on the dry side, I'd grab the old sprinkling can with an unknown quantity of water in it and deftly sweep the heap with a delicate little dribble of water that I felt and hoped would do the trick.

As time went on, I found myself slipping from grace a bit by grabbing a handful of sand after the last sprinkle instead of taking a sample through the test routine. Later I noticed that when I was in a hurry to get some castings, the thought of running into the lab, getting the weighing scales out of the box, clearing a spot on the bench, plugging in the heater and collecting a representative sample of sand corrupted me into going ahead and taking a chance, without the test. But mind you, my conscience was abusing me brutally in the meantime.

After one of these wrestlings with the Devil I got an idea. Why in the name of Heaven must my testing setup be 'way off in the opposite end of the plant? Why not have it right alongside of the sand heap, within arm's reach, so to speak. And why not have the darned thing all hooked up, ready to go on a minute's notice. In addition, why not fix it so that I could get the dope with the least figuring or fiddling around.

Although I'll have to admit that the final installation is far from looking scientific and resembles a Goldberg invention, it does the trick, by heck, not only as far as practical accuracy is concerned, but as far as human laziness and frailty are concerned. It's so handy now to run a test that I wouldn't think of going ahead without it. Besides, I've noticed that my molding luck has improved, along with the quality of my castings.



I don't imagine that a movement will sweep the foundry industry as a result of this amateur's story that will spot Goldberg testing rigs over every sand heap in the country, but I do believe we can make a darned important point concerning the middle ground somewhere between NO TESTS AT ALL and the high faluting, slide rule slipping, curve plotting, form filling rigamarole which frequently starts off in a foundry with a bang and then peters out entirely.

Here's another thing, I calibrated the scale of my moisture testing balance myself. For all practical purposes these homemade calibrations are so much better than hand testing there can be no comparison. But if the results of my tests had to check, right down to a split hair, with those being run all over the country, then I'm afraid my Goldberg rig would have to be scrapped.

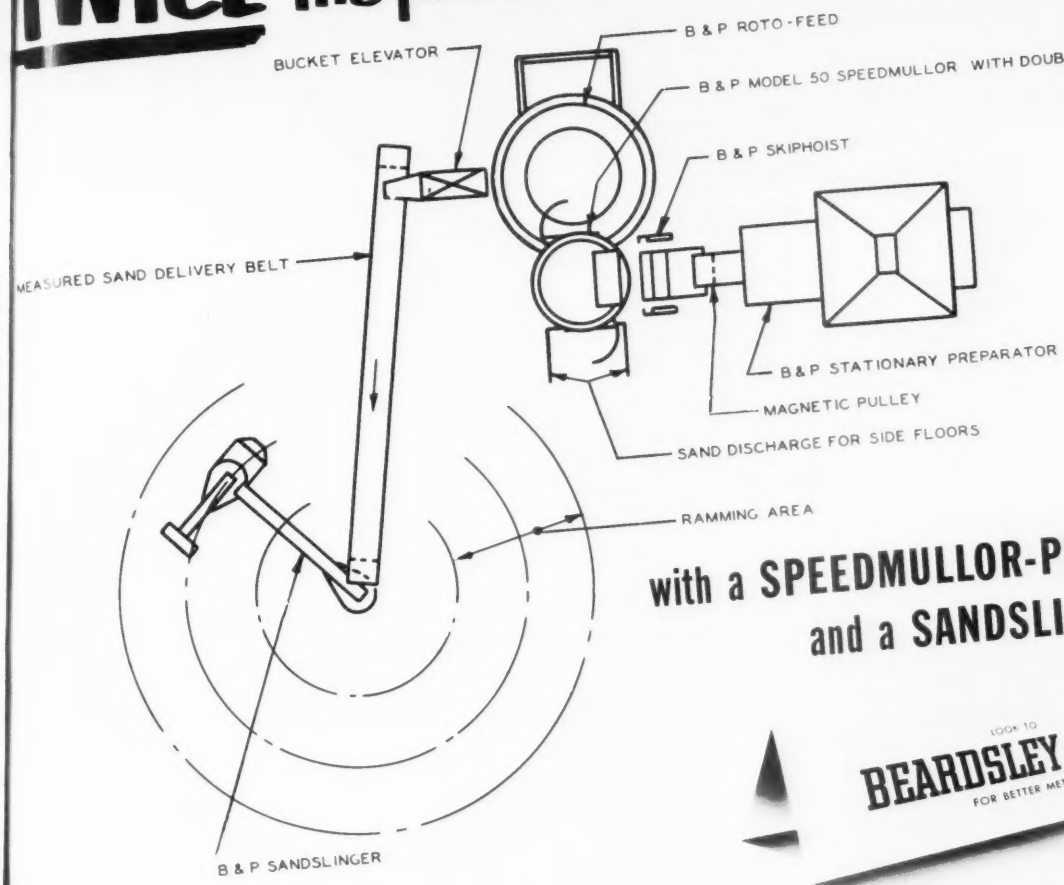
I guess it's just like measuring almost anything. Sometimes a cloth tape measure is in order, or a yard stick, steel tape, scale or micrometers. But if anyone is going to measure right down to 100,000th of an inch, not only accurately enough for the work at hand in the shop, but so that the measurements will check with those made anywhere else in the country, then Johansen Blocks or an interferometer is absolutely necessary. Furthermore, the cost of the apparatus and the work would go up with the square of the accuracy and standardization.

I visited one big foundry (and a good one) that had an elaborate rig with a horizontal paper chart on rolls that showed hourly sand tests running back over I don't know how long a time. All anyone had to do was to turn the knobs. Maybe it was necessary and paid off, but I had a hunch that the management was humoring the young fellow who showed me the system and was giving his all to testing and all it stood for.

A short time ago I visited another foundry, not nearly as big but plenty good, in which my host, by way of

(*Concluded on page* 183)

TWICE the production at KEUTHAN FOUNDRY


BUCKET ELEVATOR
B & P ROTO-FEED
B & P MODEL 50 SPEEDMULLOR WITH DOUBLE DISCHARGE DOORS
B & P SKIPHOIST
MEASURED SAND DELIVERY BELT
B & P STATIONARY PREPARATOR
MAGNETIC PULLEY
SAND DISCHARGE FOR SIDE FLOORS
RAMMING AREA
B & P SANDSLINGER

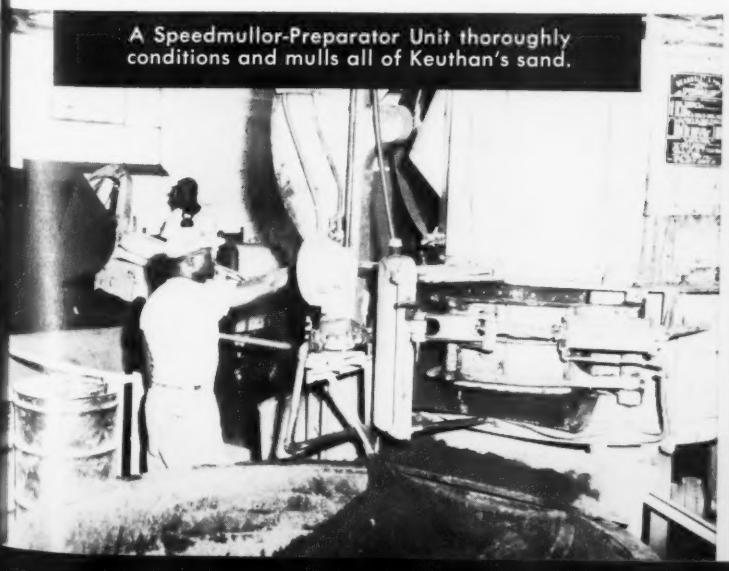
with a SPEEDMULLOR-PREPARATOR UNIT and a SANDSLINGER

LOOK TO
BEARDSLEY & PIPER
FOR BETTER METHODS

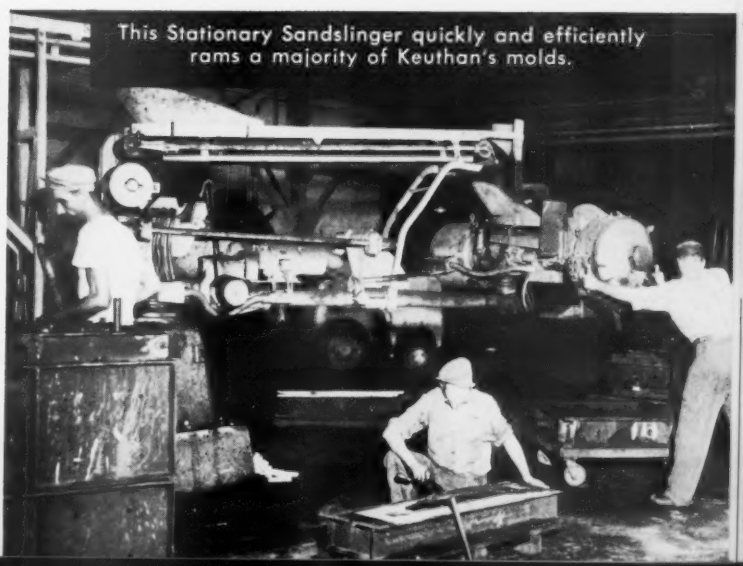
When the Black-Clawson Company, well-known manufacturer of papermaking machinery, took over the Keuthan Foundry of Middletown, Ohio, production bottlenecks were limiting output to less than eight tons a day.

Then the foundry installed a Speedmullor-Preparator Unit to thoroughly mull and prepare all of the foundry's molding sand, and a Sandslinger to ram the bulk of the foundry's molds. The cost of this mechanization was surprisingly low . . . yet capacity at Keuthan Foundry has been *doubled!* Quality is up and costs are down!

Whether you operate a small or large foundry, you can't afford to pass up the production boosting, cost-cutting possibilities of Sandslingers and Speedmullor-Preparator sand conditioning and mulling units. Write today for complete information on this equipment! Beardsley & Piper, Div. Pettibone Mulliken Corp., 2424 North Cicero Avenue, Chicago 39, Illinois.



A Speedmullor-Preparator Unit thoroughly conditions and mulls all of Keuthan's sand.



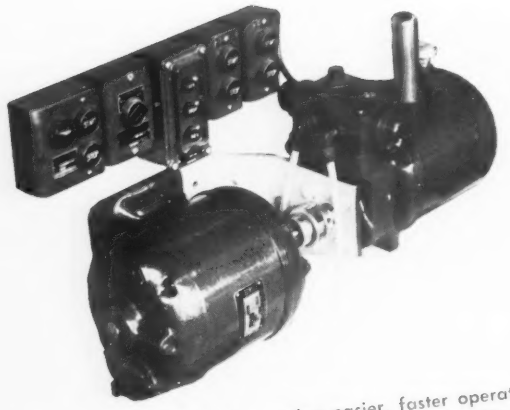
This Stationary Sandslinger quickly and efficiently rams a majority of Keuthan's molds.

The 1953

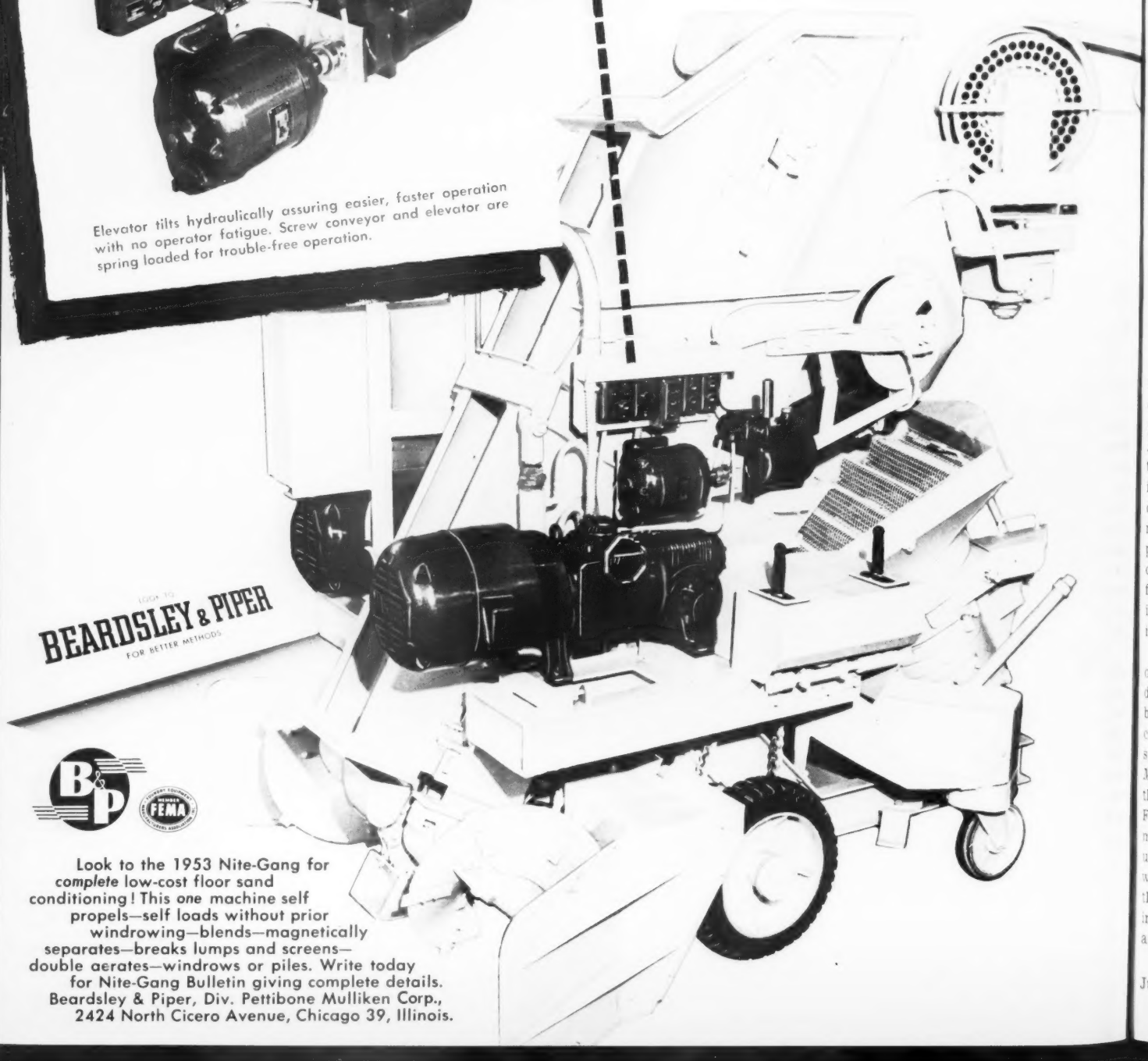
NITE-GANG

provides more important features!

- ✔ An automatic cable reel swivels in any direction—eliminates dragging cable.
- ✔ High capacity Screenarator unit with wear surfaces borium coated. High efficiency screw conveyor with borium coated edge.
- ✔ Elevator sprocket and chain bushing of special high alloy steel.
- ✔ A full 24 to 1 speed ratio—speed infinitely variable
- ✔ Centralized lubrication for conveyor screw bearings takes guesswork out of maintenance.
- ✔ Screenarator unit rotates a full 240 degrees on hardened and ground bearing plates—sand may be directed where you want it.
- ✔ Tramp iron and shot separation by permanent magnet—no rectifier required.
- ✔ Cushioned airless rubber tires—ease movement over foundry floors.



Elevator tilts hydraulically assuring easier, faster operation with no operator fatigue. Screw conveyor and elevator are spring loaded for trouble-free operation.



LOOK TO
BEARDSLEY & PIPER
FOR BETTER METHODS

B&P

MEMBER FEMA

Look to the 1953 Nite-Gang for *complete* low-cost floor sand conditioning! This *one* machine self propels—self loads without prior windrowing—blends—magnetically separates—breaks lumps and screens—double aerates—windrows or piles. Write today for Nite-Gang Bulletin giving complete details. Beardsley & Piper, Div. Pettibone Mulliken Corp., 2424 North Cicero Avenue, Chicago 39, Illinois.

(*Concluded from page* 180)

something to say as we walked through the plant, said that he thought that the last shipment of sand was a bit coarser than what the foundry was used to.

"Did you test it?" I asked.

"No," he replied. "We should have, I know. We'll probably have to rig up for it one of these days."

Next, standardization and precision of a degree necessary to great big operations or in technical research laboratories is a far cry from the practical requirements of small foundries. But in spite of this, the difference between no testing and the right amount, that any foundry can afford, is great, too great to do without. The Lord knows that there are enough variables to contend with that are almost impossible to measure.

I'll soon have a green sand strength tester right beside my moisture testing rig and sand heap. It's no scientific wonder, but it's cheap and one whale of a lot better than guessing. An epidemic of drop-outs probably spurred me to this move. And by the way, a thought just struck me. Wouldn't it be fun sometime at a foundry meeting to have a sand testing contest, including the old hand-squeeze method? I wonder how close to the instruments the old way could hit it. I might be surprised, one way or the other, but I have a hunch as to the way I'd bet.

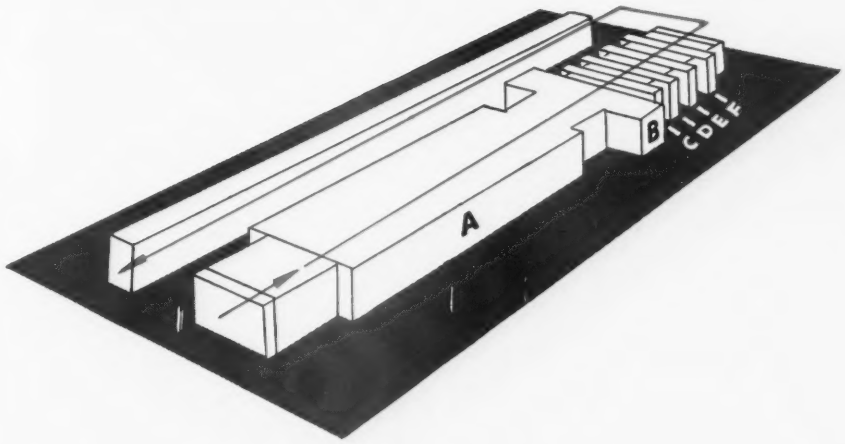
Booklet Covers Gray Iron Core Department Costing

"Advanced Cost Methods for Gray Iron Foundries," the third of a series of four publications appearing as preprints of the organization's *Cost Manual No.* 2, has been released by the Gray Iron Founders' Society to its members. The new publication covers advanced methods of determining foundry costs in the core department. The first two preprints covered melting and molding, and the fourth, to be ready for distribution in several months, will concern cleaning and shipping.

Although the preprints are intended only for members and have limited distribution, *Cost Manual No.* 2 will be available generally at a nominal charge when it is released in about six months. It will supplement *Cost Manual No.* 1, now used throughout the industry. A. E. Hageboeck, Frank Foundries Inc., Moline, Ill., is chairman of the society's cost committee, under the jurisdiction of which the work is being done. John L. Carter, the society's cost consultant, is making a major contribution to the preparation of the manual.

Heat Treat Furnace Layout

by Holcroft... 2nd of a Series



A Annealing furnace
B Hot salt quench
C Wash
D Acid bath
E Wash
F Oil dip

Volume Production Castings
Annealed, Descaled, Desanded

This "U-type" furnace layout by Holcroft ties right into the production line of a large automotive plant.

The unit anneals, descales and desands 10,000 pounds of castings each hour. After annealing, the stock is dipped in a salt quench, rinsed in water, bathed in acid, water-washed again, and dipped into a soluble oil to prevent rust. A return conveyor automatically brings the trays back to the loading point.

Unusual layouts like this present no particular problem for Holcroft. After all, it's an inherent part of the job to be completely responsible for the work—from the time it is to be heat treated to the time it's ready for finishing operations. It's the type of work Holcroft does well. Holcroft & Company, 6545 Epworth, Detroit 10, Michigan.

BUILT BY HOLCROFT & COMPANY DETROIT-MICH

PRODUCTION HEAT TREAT FURNACES FOR EVERY PURPOSE

CHICAGO 9
J. H. Bradley, A. A. Engelhardt
4209 South Western Blvd.

CLEVELAND 15
Wallace F. Schott
1900 Euclid Ave.

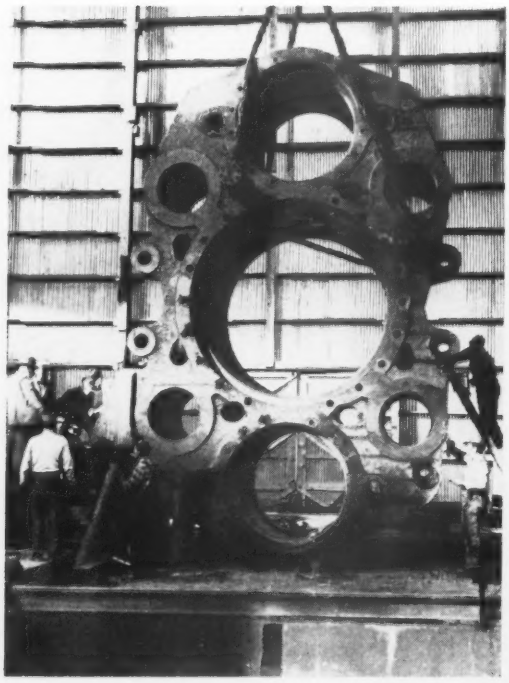
HOUSTON 1
R. E. McArdle
5724 Navigation Blvd.

CANADA
Walker Metal Products, Ltd.
Windsor, Ontario

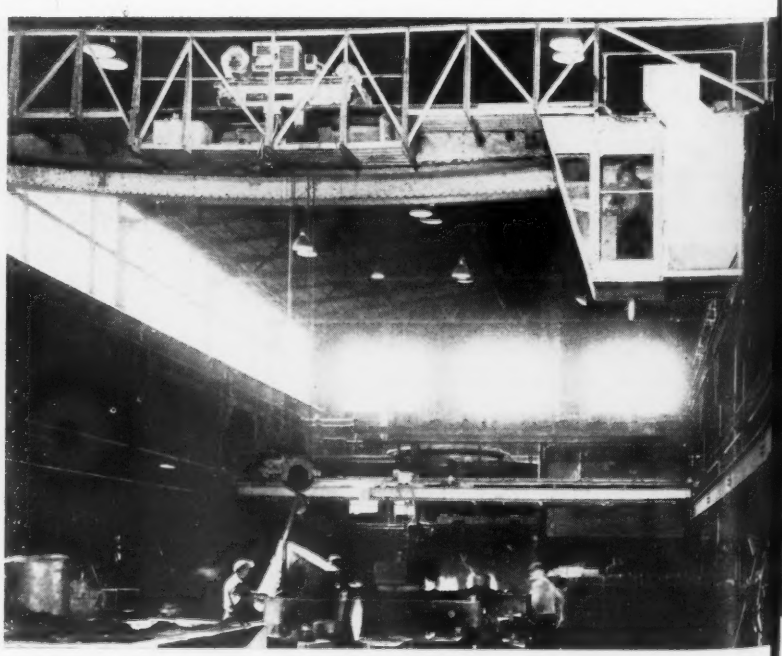
EUROPE
S. O. F. I. M.
Paris 8, France

100-TON IRON CASTING: Using four ladles and overhead cranes, the Westinghouse Electric Corp. foundry at Trafford, Pa., recently poured a 100-ton iron casting, the largest the firm has ever produced. It will become an ingot mold for United States Steel's Homestead plant. Although poured in only six minutes, the giant casting required two weeks to cool

AIR TOOL TRAINING: Twenty-five naval and civilian representatives of nine naval shipyards over the United States met recently at Cleco Pneumatic Tool Division, Reed Roller Bit Co., Houston, Tex., for a 5-day training program in the use of pneumatic tools. T. M. Kelley, right, Navy Bureau of Ships, is receiving his certificate for having completed the course from W. J. Vossbrinck, Cleco sales manager at the time this presentation was made

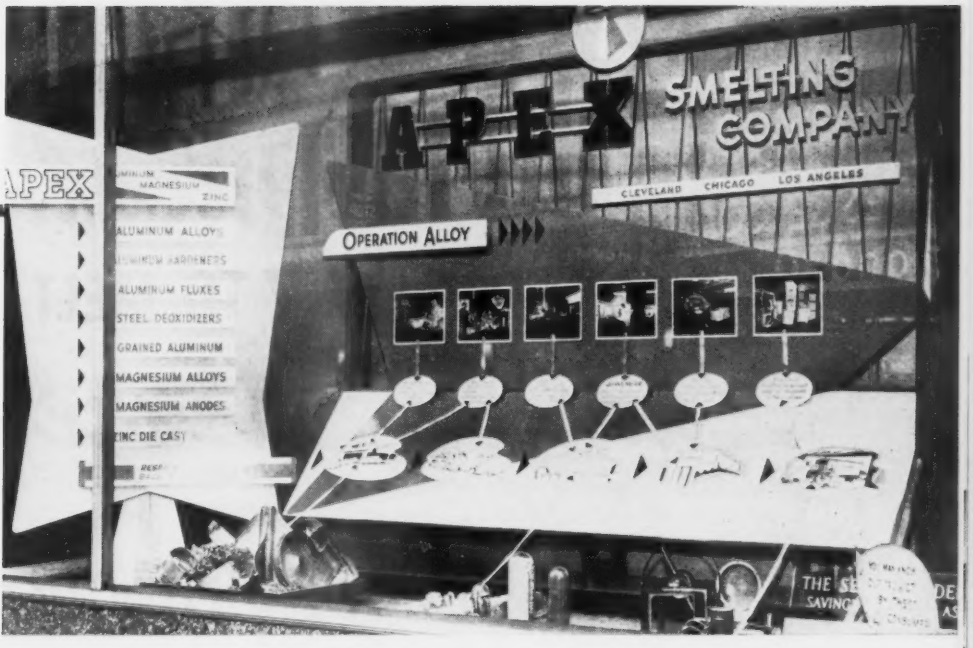


107-TON STEEL CASTING: This 107-ton cast steel cylinder housing is part of a 14,000-ton extrusion press recently installed at the Aluminum Co. of America plant at Lafayette, Ind., by F. H. McGraw & Co., New York. Said to be the largest ever erected in this country, the press can squeeze out larger and more intricate airplane parts than was previously possible. The 107-ton casting was made in Dusseldorf, Germany, by Schloemann foundry



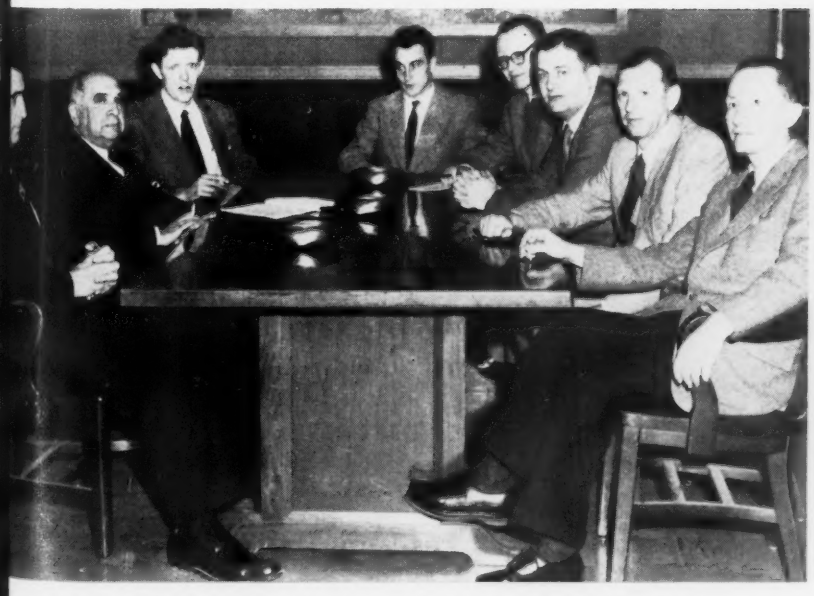
FUME-FREE AIR: Mounted on the side of the crane cab, an air conditioner made by Dravo Corp., Pittsburgh, furnishes fume-free air to the foundry crane operator at Greenlee Bros. & Co., Rockford, Ill. It also is equipped with electric strip heaters that can warm the cab

Views



OPERATION ALLOY: The importance of aluminum smelting to American industry was demonstrated recently to Cleveland citizens by the Cleveland plant of Apex Smelting Co., Chicago. Filling three Second Federal Savings & Loan Association windows, one of which is shown here, the display showed how scientific smelting processes convert obsolete scrap materials into first-quality aluminum and how the industry provides alloy to foundries

SAFETY FIRST: Ned Dearborn, right, National Safety Council president, presents his organization's top honor, the Award of Honor plaque, to Vice President Ralph Mond, Caterpillar Tractor Co., Peoria, Ill., which also won the award in 1944 and 1950. The 1952 record was 2.8 lost-time accidents per million man-hours and 0.67 days lost per 1000 employees because of plant accidents



AUSTRIAN ENGINEERS: Ajax Engineering Corp., Trenton, N. J., was host recently to the Austrian Electrical Heating Industry Team, a group of engineers from Vienna who visited American industrial plants under the auspices of the Mutual Security Agency. This scene at the Ajax plant shows the Austrian delegation at the right and Ajax personnel at the left

FOUNDRY IRON: Harry Jenter, Cleveland district manager of operations, American Steel & Wire Co., Division of United States Steel Co., breaks ground for a new blast furnace for production of merchant pig iron to serve foundries in the area. Cleveland's Mayor Thomas A. Burke watches. To be in operation a year hence, it will turn out approximately 1350 tons of pig iron per day

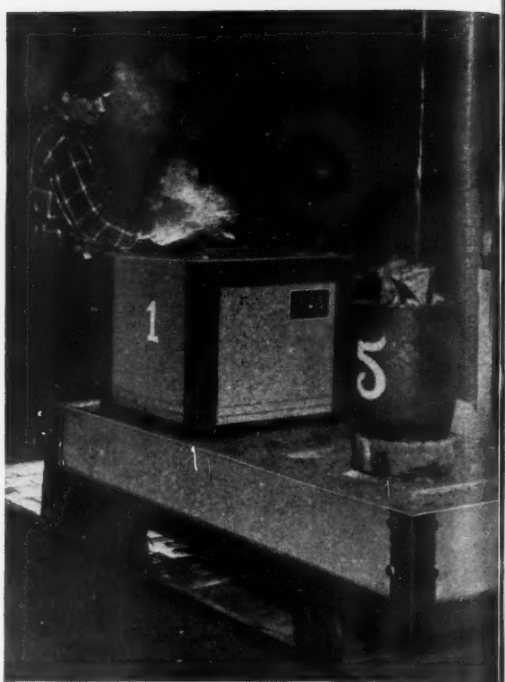
THE MOST *Economical* WAY TO MELT *Quality Bronze*

AJAX-NORTHRUP INDUCTION FURNACES

An Ajax-Northrup equipped bronze foundry, melting a wide variety of alloys in lift-coil furnaces, reports 10% higher tensile strength for certain of its induction-melted alloys . . . and has reduced melting costs by over $33.00 a ton at the same time!

Similar performance is reported by users of the larger tilting furnaces. The tilting units are slightly more efficient than the lift-coil equipment, and are used where ability to switch alloys frequently is less important.

If you haven't looked into the possibilities of induction melting for your non-ferrous foundry lately, we'd like to show you some of the data we've gathered from recent installations. Just write or phone us.



LIFT-COIL FURNACES *can melt different alloys simply by switching crucibles.*

TILTING FURNACES *are used for larger quantities, or special production runs.*

149

AJAX NORTHRUP

INDUCTION HEATING AND MELTING

AJAX ELECTROTHERMIC CORPORATION
Ajax Park, Trenton 5, New Jersey

Associated Companies

AJAX ELECTROMETALLURGICAL CORP.
AJAX ELECTRIC FURNACE CORPORATION
AJAX ELECTRIC COMPANY, INC.
AJAX ENGINEERING CORPORATION

Since 1916

Activities of Foundry Groups

Chesapeake

ON SUNDAY, Apr. 19, a public openhouse was held by the new Mergenthaler Vocational Technical High School in Baltimore. The city's Board of Education invited the Chesapeake Chapter of the AFS to sponsor the school's cast metals course. The chapter's Educational Committee, with the co-operation of local foundries, arranged exhibits of patterns, cores and castings, and labeled the pieces of equipment to explain their function in producing castings. In addition, foundrymen were present to explain the various phases of foundry operations.

One of the exhibits was a complete set of AFS publications which the chapter is donating to the Cast Metals Laboratory with the hope that it will become a nucleus for a fine metals library. The Foundry Educational Foundation co-operated by supplying data for charts on foundry employment and production as well as providing a supply of literature explaining the functions of the FEF to high school students.

Named after Ottmar Mergenthaler, a Baltimore citizen who invented the linotype machine, the school accepts students based upon aptitude tests given while they are attending junior high school.

Students taking the cast metals course will devote about half their time in the laboratory learning fundamentals of sand and foundry molding technique. Other classes will include mathematics, English, history, elements of chemistry and physics, mechanical drawing, shop mechanics, mechanical laboratory testing and pattern making. With additional credits in a foreign language the school's graduates will be able to enter most engineering colleges.

During the openhouse approximately 5000 visitors made their way to the fourth floor of the Machinery Building to see the Cast Metals Laboratory. Its equipment, when complete, will include a full line of sand testing equipment, portable sand muller, jolt-squeeze molding machines, electric melting furnace, core oven and air-less blast cleaning machine, in addition to numerous steel flasks and the usual small accessories.

The laboratory also will be used by students of such subjects as mechanical drawing, general machine shop and pattern making who will be taught the fundamentals of the foundry trade.—*Lewis H. Gross, American Radiator & Standard Sanitary Corp.*

Northwest Foundrymen To Meet Oct. 16-17

Under the joint sponsorship of the Washington, Oregon and British Columbia Chapters of the AFS, the Oregon Student Chapter of the AFS, and with the co-operation of the University of Washington, the fourth annual Northwest Regional Conference is being planned. Meeting will be held at Seattle with headquarters at the New Washington hotel, Oct. 16-17.

The Friday afternoon sessions will be held at the hotel with the following papers scheduled: "Gas in Metals," by Dr. L. W. Eastwood, assistant director, Division of Metallurgical Research, Kaiser Aluminum & Chemical Corp.; "Shell Molding," by Bernard N. Ames, supervising physical metallurgist, Material Laboratory, New York Naval Shipyard. There will be a banquet Friday evening at which Dr. Warren E. Tomlinson, College of Puget Sound, will be the speaker.

On Saturday the sessions will be held at the University of Washington. In the morning H. H. Kessler, manager, foundry operations, Sorbo-Mat Process Engineers, will present a paper on the "Basic Cupola," followed by Cliff Wenninger, National Engineering Co., Chicago, who will speak on "Sand Reclamation."

Following lunch, films on materials handling and cupola maintenance will be shown. Final paper is on "Refractories" with Lee Bennett, Gladding McBean, as speaker. The conference concludes with a dance at the New

CHESAPEAKE Chapter of the AFS participated in the first Open House Day of the Mergenthaler Vocational Technical High School in Baltimore on Apr. 19. The scenes above show some guests inspecting exhibits of castings which were displayed at the affair and described by members of Chesapeake Chapter

EASTERN NEW YORK Chapter of the AFS heard Frank Brewster, Harry W. Dietert Co., Detroit, discuss sand control at the April 21 meeting. From left to right are Director Jack Waugh, General Electric Co.; Vice Chairman Ed Laurence, General Electric Co.; Mr. Brewster, who is picking the winning dinner ticket, and Chairman Leigh Townley, Adirondack Foundry & Steel Corp.

Washington hotel.

A cordial invitation is extended to the ladies to attend, and plans for their entertainment on Saturday are being made.

Central Illinois

AT THE MAY 4 meeting of Central Illinois Chapter of the AFS, Ben H. Taylor, industrial relations manager, B. F. Goodrich Co., Akron, O., was the featured speaker. His topic was "Today's Challenge in Human Relations."

He stated, "I'm not afraid of the few Communists in U. S. industry. I fear the millions of honest American workers who have real doubts whether they're getting a fair shake from the free enterprise system. In the next 10 years," he continued, "America will decide whether free enterprise is to continue here. The real tragedy of our large American plants—which have raised our standard of living to the world's highest—is that many workers have never learned how important their individual jobs are. Free enterprise has fallen down on its public relations. People don't know the good things it has done for all of us."

Mr. Taylor pointed out it is possible to buy an employee's time, physical presence and skill, but you must earn his enthusiasm and loyalty. This is accomplished by giving workers a sense of pride in their job and showing them they are vital to the final product.

Cliff Hathaway, assistant labor relations manager, Caterpillar Tractor Co., served as technical chairman, and pointed to the excellent attendance at the meeting as an indication of the awareness of the importance of human relations in continuing the progress of the American standard of living.

Officers to serve during the coming chapter year were elected. Henry Felten, plant engineer, Peoria Malleable Casting Co., is the new chairman; Burton Bevis, supervisor, education and training department, Caterpillar Tractor Co., is vice chairman; J. Hrvatin, staff engineer, Caterpillar Tractor Co., secretary-treasurer.

Newly elected directors are: George Rockwell, Caterpillar Tractor Co., retiring chairman; Gilbert Lloyd, Brass Foundry Co.; and Robert Paluska, Precision Patterns, all of Peoria.—*L. E. Kinsinger, Caterpillar Tractor Co.*

CENTRAL ILLINOIS Chapter of the AFS was addressed on May 4 by Ben H. Taylor, industrial relations manager, B. F. Goodrich Co., Akron, O. Left to right are Cliff Hathway, chapter technical chairman, Caterpillar Tractor Co., Peoria, Ill.; Mr. Taylor; and John Hrvatin, Caterpillar Tractor Co.

Pittsburgh

APPROXIMATELY 135 members of the Pittsburgh Foundrymen's Association attended the Apr. 20 meeting of the group at Webster Hall Hotel. Featured speaker was W. H. Moore, metallurgist for Meehanite Metal Corp., who spoke on sand control. Mr. Moore has done extensive research on this subject and holds several patents on processes he has developed.

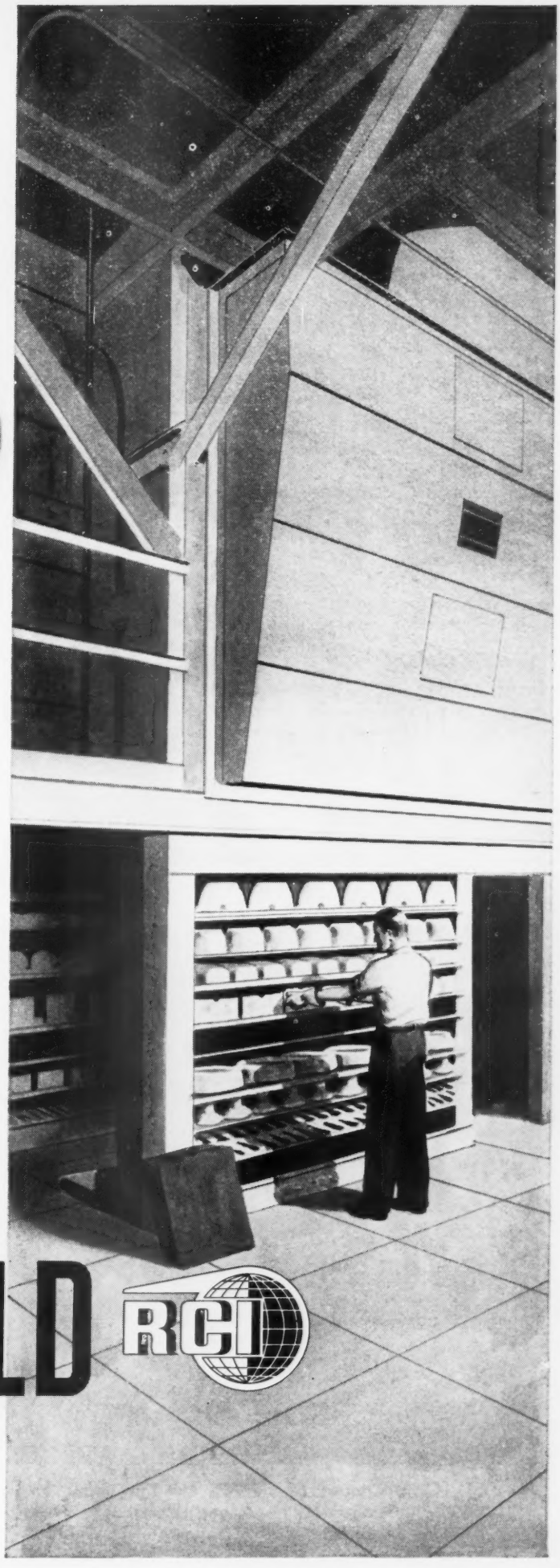
He emphasized that two principles must be considered to obtain proper sand control: One, flowability is a fundamental property of any sand mix; two, surface is a direct function of the grain of the sand. These must be observed for best casting practice.

Said Mr. Moore, "Sand must be run at a certain degree of temper. It must feel right. You can easily feel whether it is over tempered or under tempered. To obtain the proper results sand must be worked at about 1 to 1½ per cent of moisture content beyond the maximum strength of the sand. As you increase the

(*Continued on page* 190)

Cut Core Costs—
Double Core Production with

FOUNDREZ 7101



Your cores will cost less per ton, and bake out faster, if you switch from ordinary core oils to RCI'S FOUNDREZ 7101—a water-dispersing, phenol-formaldehyde binder.

Because FOUNDREZ-bonded cores bake out in about half the time of oil-bonded cores, you can double your production without adding any extra oven equipment.

What's more, you get a superior core. Tensile strength and hardness are greater. Permeability is increased. Gassing is reduced. Hot strength is higher. Less cereal binder is needed. And shake-out is better, saving time and material in cleaning finished castings.

Get the full facts on FOUNDREZ 7101 by writing for Technical Bulletin F-1.

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Synthetic Resins • Chemical Colors • Phenolic Plastics • Phenol
Glycerine • Phthalic Anhydride • Maleic Anhydride
Sodium Sulfate • Sodium Sulfite

SOUTHERN CALIFORNIA Chapter of the Non-Ferrous Founders' Society held the third in a series of instructive programs on May 14. Left to right are President Joseph Troncale; Dr. E. I. Valyi, A. R. D. Corp., guest speaker; vice president C. J. Egetter; and Gordon Sondraker, who introduced Dr. Valyi

(*Continued from page* 188)

moisture content, you reduce the ventability of a sand. Optimum temper point is the point of maximum temper and minimum permeability."

The speaker recommended plotting routine sand tests. "In this manner," he stated, "you can remove the moisture variable and tell which way your sand is going, which way it is going to behave in practice in order to give you the type of performance you want."

He also pointed out that sands that increase strength during the first few moments of heating are best. Buckling and rat tails occur within a very few moments after contact with heat. Proper degree of sand hot strength is necessary to avoid such occurrences.

As a simple means of measuring hot strength, Mr. Moore recommends holding a frame full of rammed sand about ¾-in. away from molten metal. If buckling will occur, it can be seen immediately. If the sand holds up for three minutes, it will never buckle.

In conclusion, Mr. Moore stated that casting characteristics are affected by both metal properties and mold properties. "Smoothness," he said, "is a function of sand grain, sand texture and mold rigidity. All of these must be rigidly controlled to obtain a smooth casting."

—*Robert E. Hall*

Southern California

ON May 14 the Southern California Chapter of the Non-Ferrous Founders' Society meeting in Los Angeles, held its third in a series of chapter meetings. Guest speaker was Dr. E. I. Valyi, president of ARD Corp., whose topic was shell molding.

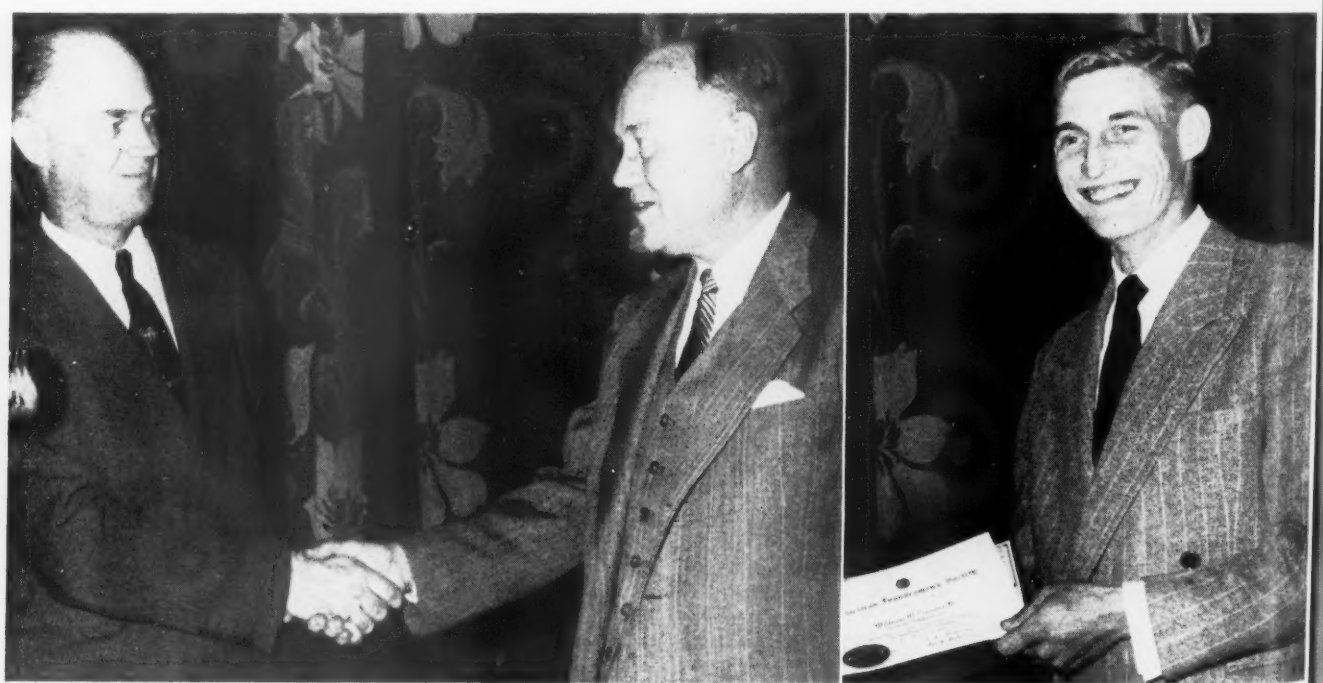
Dr. Valyi led his listeners through each step in the making of castings with what he termed "controlled or precision facings." The group gathered that shell molding is somewhat of a problem child that requires skill and care in its use.

Because of the increased attendance, the chapter is continuing the programs during the summer. Meetings will be held at the Rodger Young auditorium on the second Thursday of the month, and President Joe Troncale invited all nonferrous foundrymen if they are visiting Los Angeles, to attend the meetings.—*H. H. Barnes.*

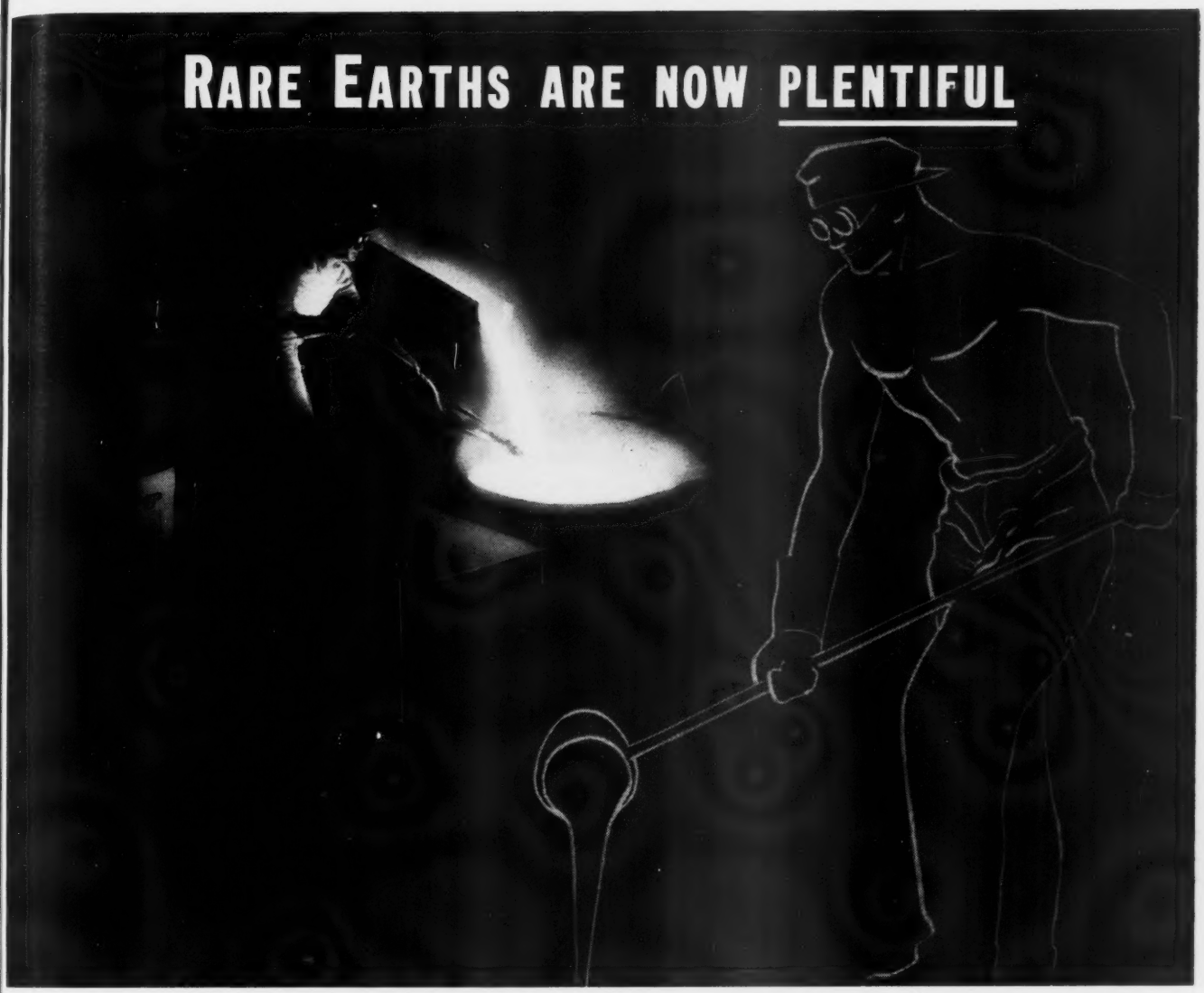
St. Louis

THE coffee talk presented by Robert Wolf, Missouri School of Mines & Metallurgy, Rolla, Mo., at the April meeting of St. Louis District Chapter of the AFS featured a motion picture

(*Continued on page* 192)



ST. LOUIS Chapter of the AFS met May 14. Left view, Chairman Henry W. Meyer, left, General Steel Castings Co., congratulates Chairman-elect Webb L. Kammerer, Midvale Mining & Mfg. Co. Right view shows William Zimmer, patternmaking apprentice, Arnette Pattern Co., with the certificate he received for placing third in the wood pattern division of the AFS national apprenticeship contest



For generations, chemical elements 57 to 71 had been simply classified in a general group as "rare earths." First known in their oxide form, they are actually metals rather than earths. Molybdenum Corporation's recent discovery of the world's largest known deposit of rare earths in California indicates that rare earths will be in abundant supply for years to come. This deposit is being improved and expanded.

Molybdenum Corporation's RareMet T-Compound, currently the most economical rare earth additive, has been found to help counteract the effect of tramp elements found in nodular iron. Consistently good ductility has been obtained in production heats of nodular iron containing excessive amounts of lead and titanium.

RareMet T-Compound is packaged in 10 pound drums and in 6 drums per carton. Very easy to handle!

Molybdenum Corporation of America invites inquiries and correspondence on Molybdenum, Tungsten, Boron and Rare Earths, also the chemicals of these alloys. Immediate response is assured.

MOLYBDENUM

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Offices: Pittsburgh, Chicago, Cleveland, Detroit, Los Angeles, New York, San Francisco
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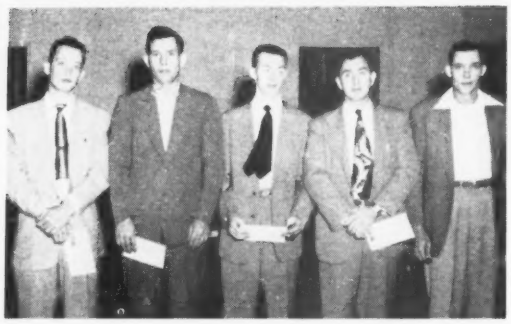
Subsidiary: Cleveland-Tungsten, Inc., Cleveland, Ohio
Plants: Washington, Pa. and York, Pa.

MCA



BIRMINGHAM Chapter of the AFS apprenticeship contest first prize winners are shown here from left to right, J. L. Cummings, A. O. Eidson, Miles C. Stephens Sinclair Lathem and V. L. Bradford. Both Mr. Stephens and Mr. Lathem are from the University of Alabama. The others are all from Stockham Valves & Fittings Inc.

(*Continued from page* 190)

showing processes employed in the school's educational foundry in teaching foundry practice. Mr. Wolf thanked the 125 members present at the meeting and expressed gratitude to the FEF for the excellent support of the school's foundry program.

The principal speaker was John Mescher, core supervisor of Unitcast Corp., Toledo, O., whose topic was "Latest Development in Core Blowing." He first reviewed fundamental principles of core blowing and explained the relative advantages of various types of equipment available. Mr. Mescher pointed out the need of proper sand, corebox design and placement of blow holes and vents to produce maximum core quality at lowest cost.

Mr. Mescher subsequently spoke on "The Nature of the Enemy." He outlined the fundamental principles of communism and how they are diametrically opposed to democracy and Christian civilization. Mr. Mescher believes an effective means of making democracy strong and of protecting our free enterprise system is to strive for more efficient productivity.

Election of officers was a feature of the May 14 meeting of St. Louis District Chapter of the AFS. New chairman selected for 1953-54 is Webb L. Kammerer, Midvale Mining & Mfg. Co., St. Louis; Fred J. Boeneker, Bronze Alloys Co., is vice chairman; Paul E. Retzlaff, Nordberg Mfg. Co., secretary and John H. Culling, Carondelet Foundry Co., treasurer.

Directors elected to serve three years include: Dale Arnette, Arnette Pattern Co., Granite City, Ill.; John O'Meara, Banner Iron Works, St. Louis; R. O. Tibbals, American Steel Foundries, Granite City, Ill. Henry W. Meyer, General Steel Castings Corp., Granite City, Ill., retiring chairman will serve for one year.

There was a moment of silent pray-

(*Continued on page* 194)

NEW ENGLAND FOUNDRYMEN'S ASSOCIATION members on May 13 visited New England's only blast furnace, at Eastern Gas & Fuel Associates, Everett, Mass. More than 350 foundrymen from the area made the 2½-hour tour, part of it on the special sightseeing train shown in the top view. Lower scene shows, left to right, Henry G. Stenberg, Draper Corp., Hopedale, Mass., vice president, NEFA; Joseph H. Treanor, vice president of Eastern Gas & Fuel and president of its sales subsidiary, Mystic Iron Works, which acted as host; J. A. Claussen, chief, pig iron section, National Production Authority; and Halfdan Lee, president, Eastern Gas & Fuel Associates

This 85" hollow-section ring is produced by The French Oil Mill Machinery Company, Piqua, Ohio. It weighs 6500 lbs. and meets tensile strength requirements of 40,000 lbs.

FOR HOLLOW-SECTION CASTINGS...

CHATEAUGAY TOPS THEM ALL!

Consider, for example, this giant ring—a component of the desolventizer toaster used in processing soya beans into cattle feed. Hollow passages between the ¾" thick dual wall sections form a pressurized steam chamber. Because of this, each finished casting must undergo a 300 psi water pressure test before passing code inspection.

Here are the reasons why CHATEAUGAY, Republic's *exclusive* premium pig iron, is used in this application:

1. **CHATEAUGAY is an exceptionally fluid iron . . . cools evenly . . . fills adjoining light and heavy sections completely.**
2. **CHATEAUGAY shrinks evenly throughout every casting . . . produces an unusually fine and uniform grain structure.**
3. **CHATEAUGAY castings machine readily.**

Whether or not you use CHATEAUGAY Pig Iron, a Republic Pig Iron Metallurgist will be glad to help you get top production from your present facilities. Just let us know when you would like to see him.

REPUBLIC STEEL CORPORATION
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Export Department: Chrysler Building, New York 17, New York

Republic PIG IRON

"CHATEAUGAY"	"REPUBLIC"	"PIONEER"
Low-Phosphorus, Copper-Free	(Northern) Foundry, Basic and Malleable	(Southern) Foundry and Basic

REPUBLIC STEEL

OFFICERS of the Northwestern Pennsylvania Chapter of the AFS on Apr. 24 presented a film strip program entitled "A Career in Metal" to F. R. Ferguson, administrative head, Behrend Center, Pennsylvania State College. Left to right are Educational Director Earl Strick, Erie Malleable Iron Co.; Mr. Ferguson; Chairman Fred Carlson, Weil-McLain Co.; Harold Werner, engineering instructor, Behrend Center; T. E. Campbell, assistant administrator, Behrend Center, and Secretary Bailey Herrington, Hickman, Williams & Co.

(*Continued from page* 192)

er in tribute to two members of the chapter who died recently—George W. Mitsch, American Car & Foundry Co., and Parker H. Woods, St. Louis Coke & Foundry Co.

Two sound films completed the program. "Men and Molds," showing operations at Lynchburg Foundry Co., Lynchburg, Va., and 1952 World Series baseball films were presented.—*Fred J. Boeneker, Bronze Alloys Co.*

Northwestern Pennsylvania

THE SPEAKER, Tom Barlow, sales manager, Eastern Clay Products Co., division of International Minerals & Chemical Corp., Chicago, attracted a large number of members and guests to the Apr. 27 meeting of Northwestern Pennsylvania Chapter of the AFS held in Erie, Pa. His talk was entitled "Casting Defects in relation to Sand Practice."

The Foundry Sand School held by the Chapter May 18-21 was well attended. The course was directed by F. S. Brewster, vice president and general manager of Harry W. Dietert Co., Detroit. It consisted of 12 hours of illustrated lecture and covered the following subjects: Reasons for sand control, how it is used, basic principles and its organization; individual properties such as moisture, permeability, grain size and clay distribution, green and baked core tests, etc.; and the concluding portion dealt with individual problems and examination of castings submitted.—*Roy A. Loder, Erie Malleable Iron Co., and J. P. Finch, General Electric Co.*

Twin City

AT ITS MAY 12 meeting the Twin City Chapter of the AFS concluded the current chapter year on a purely entertainment note. L. P. Robinson, vice president, Foundry Products Division, Archer-Daniels-Midland Co., Cleveland, presented his famous commentary on chicken farming.

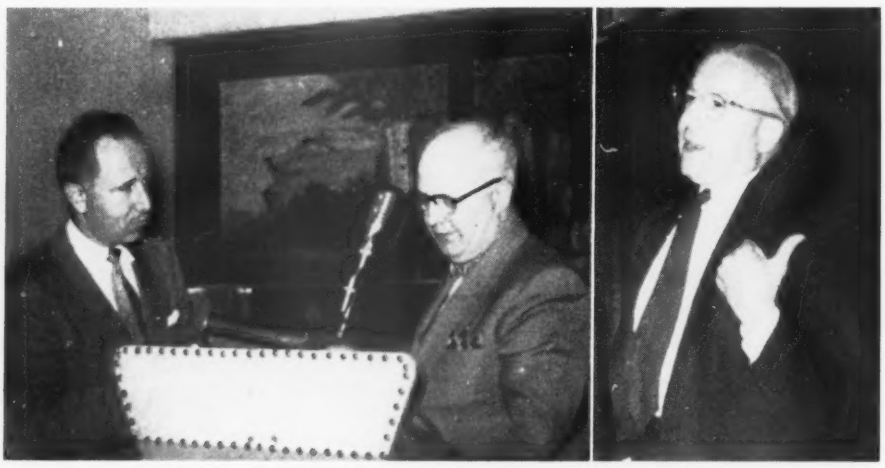
Retiring chairman J. W. Costello cited his several committeemen for their fine work. Receiving special mention were R. Wilson, American Hoist & Derrick Co., as chairman of Technical Sessions Committee, and J. D. Johnson, Archer-Daniels-Midland Co., chairman of the Educational Committee.

Three field trips for students and apprentices were arranged during the year and included visits to Minneapolis Electric Steel Castings Co., Minneapolis-Moline Lake Street plant and to American Hoist & Derrick Co. These and other inducements to introduce the foundry industry to the students of the area resulted in 12 student memberships being added to the chapter roster.

While not a national apprentice contest winner, Loren Selvog, American Hoist & Derrick Co., placed highest in the contest of those entered from the area and for this the chapter awarded him a check for $25.

The chapter's annual golf outing will be held Aug. 3 at Midland Hills Country Club. J. Garski is chairman of the committee making arrangements.

Newly elected chairman, O. J. Myers, Archer-Daniels-Midland Co., was presented the chairman's gavel which had been made and presented to the chapter by retiring chairman J. W. Costello.—*R. J. Mulligan, Archer-Daniels-Midland Co.*



TWIN CITY Chapter of the AFS met May 12. On the left, J. W. Costello, right, American Hoist & Derrick Co., St. Paul, retiring chairman, presents the gavel of chairmanship to O. J. Myers, Archer-Daniels-Midland Co., Foundry Products Division. In the right view, L. P. Robinson, Archer-Daniels-Midland Co., Cleveland, explains an important point in his humorous talk on chicken farming. Photos are by Robert J. Mulligan, Archer-Daniels-Midland

Metropolitan

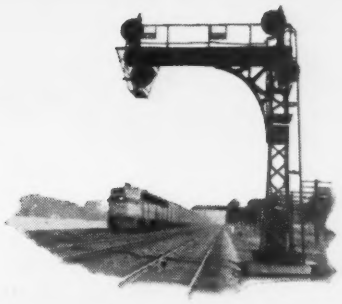
SPEAKER at the Apr. 6 meeting of Metropolitan Chapter of the AFS held at Hotel Essex, Newark, N. J., was Clyde B. Jenni, chief metallurgist, General Steel Castings Corp., Eddystone, Pa.

"Detection and subsequent evaluation of defects are two inseparable phases of nondestructive testing," in the opinion of Mr. Jenni. The detection of defects and arbitrary scrapping of parts is not the aim or purpose of the various methods available for nondestructive testing. Whatever the method or tool used, it merely provides the inspector with information he must use to determine whether the part in question can perform its intended service. Mr. Jenni cautioned against the possibility of rendering a part less serviceable by attempting repairs than if no salvage effort were made.

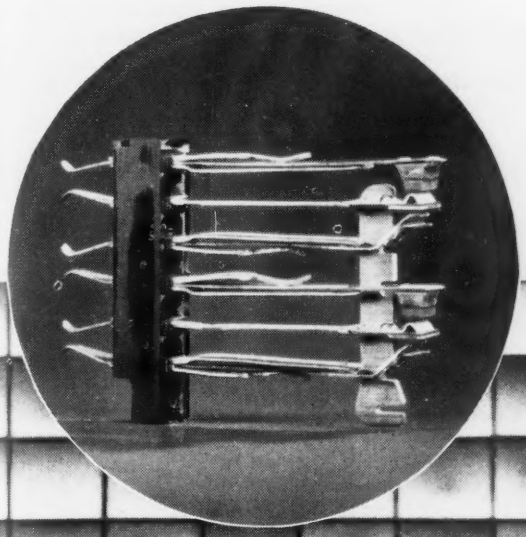
As an example of this, he mentioned the possibility of replacing a

(*Continued on page* 197)

These relay contacts



spell train safety—



Relay contact assembly showing silver-carbon contacts.

Radiograph discloses contacts with improper silver dispersion.

RADIOGRAPHY gives them the "Green Light"

RELAY CONTACTS for railway signals must have low resistance. Ideally, this would call for silver touching silver—but pure silver contacts might fuse if overloaded and the signal lock on green. Carbon contacts can avoid this but have too high resistance.

The answer lies in impregnating carbon with silver, then making sure by radiography that the silver grains are properly dispersed throughout the carbon. This provides assurance that the relay will have a non-fusing contact with low resistance.

It's another example of how radiography can prove internal soundness, whether in such a compound as this, in a casting, or a weld.

Radiography is improving products and production in many kinds of operations. To learn how it can help you, see your x-ray dealer.

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X-ray Division, Rochester 4, N. Y.

Radiography...

another important function of photography

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TRADE MARK

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IRON FOUNDRY ALLOYS

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- *Produced to the highest standards of uniformity from the finest of raw materials.*

FERROCHROMIUM ALLOYS

Iron Foundry Grade—a readily soluble alloy for moderate chromium additions to cast iron.

High Carbon Grade—a standard alloy for moderate chromium additions to medium and high carbon irons.

Briquettes—a practical and convenient form for adding ferrochromium to the cupola.

Vancromsil—a medium carbon grade of ferrochromium-silicon recommended as both a chromium and silicon addition to cast iron.

FERROSILICON ALLOYS

25% Grade—recommended as a silicon addition to cast iron.

50% Grade—for silicon addition to iron.

75, 80/85, 85/90, 95% Grades—for slag treatment and graphitization of iron.

Briquettes—a practical and convenient form for adding ferrosilicon to the cupola.

FERROVANADIUM ALLOYS

Iron Foundry Grade—an economical means of improving the physical properties of cast iron.

Open Hearth Grade—widely used as a vanadium addition to cast iron.

SPECIAL ALLOYS

Graphidox No. 4—an alloy of silicon, titanium and calcium which gives maximum efficiency as graphitizer and deoxidizer of cast iron.

V-5 Foundry Alloy—an alloy of chromium, manganese and silicon; highly effective in reducing chill and increasing strength and hardness in cast iron.

Noduloy Alloys—widely used in the production of nodular iron.

There is also a complete range of Vancoram alloys for steel foundry applications.

Your nearest Vanadium Corporation office will be glad to give you complete information on any of the Vancoram Foundry Alloys

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COLUMBUS • TOLEDO

(*Continued from page 194*)

round, smooth gas-type defect—often harmless—with sharp crack-type defects—usually serious—during welding operations.

The speaker covered principles and practices involved in radiography, including low-voltage x-ray, gamma ray, and high-voltage betatron methods. In addition, he spoke of the use of ultrasonics, dye penetrants and magnetic methods, as well as the strain gage techniques, and pointed to their advantages and limitations. Mr. Jenni emphasized the importance of non-destructive testing in not only evaluating current designs but in developing improved designs. He illustrated his remarks with several interesting slides.

Bernard N. Ames, senior metallurgist, Material Laboratory, New York Naval Shipyard, served as technical chairman.—*Robert J. Ely, American Brake Shoe Co.*

Canton

CONCLUDING the year's chapter meetings, the Canton District Chapter of the AFS met at the Mergus Restaurant in Canton, O., Apr. 2. Guest speaker was J. A. Gitzen, president, Delta Oil Products Co., Milwaukee, whose talk was entitled "Sand Additives." He discussed both the proper use of sand additives and some common misuses. C. B. William, Massillon Steel Castings Co., presided and Robert A. Epps, Stoller Chemical Co., introduced the speaker.

Election of the following officers to serve during 1953-54 was announced: Chairman: Robert A. Eps, Stoller Chemical Co., Alliance, O.; vice chairman, Alfred S. Morgan, Babcock & Wilcox Co., Akron; secretary, H. S. Stoller, Stoller Chemical Co., Akron; treasurer, Wendell W. Snodgrass, Massillon Steel Casting Co., Massillon, O.

Directors elected to serve a three-year term are: L. L. Whitney, American Steel Foundries, Alliance; H. A. Biddinger, F. E. Myers & Bros. Co., Ashland, O.; and Lester F. Stahler, Stark Foundry Co., Canton, O.—*R. R. Kozinski, Canton Malleable Iron Co.*

Tennessee

REGULAR meeting of Tennessee Chapter of the AFS was held at Hotel Patten, Apr. 24, with 75 members and guests present. Speaker was S. C. Massari, technical director of AFS, whose subject was "Effect of Gating Design on Casting Quality."

The nominating committee submitted the following slate of officers: Chairman, Will Delaney, Eureka Foundry Co., Chattanooga; vice chairman Charles Chisholm, Wheland Co., Chattanooga; secretary-treasurer, Carl A Fischer Jr., Fischer Supply Co., Chattanooga.

W. M. Hamilton, Crane Co., Chattanooga, and James B. Mullenix, Foundries Supply Co., Chattanooga, were elected directors to serve one year; Tink A. Johnson, Somerville Iron Works, Chattanooga and Roy H. Baker, Lenoir Car Works, Lenoir City, Tenn., were elected directors for three-year terms.—*Porter Warner Jr., Porter Warner Industries.*

TENNESSEE Chapter of the AFS met Apr. 24 at the Hotel Patten, Chattanooga. Among those present were, left to right, Mr. Waddington and Geoffrey Taylor, Ashmore, Benson & Pease & Co., Stockton-on-Tees, England, who came to America to investigate shell molding, and John McClanahan, Ross-Meehan Foundries Inc.

Wisconsin

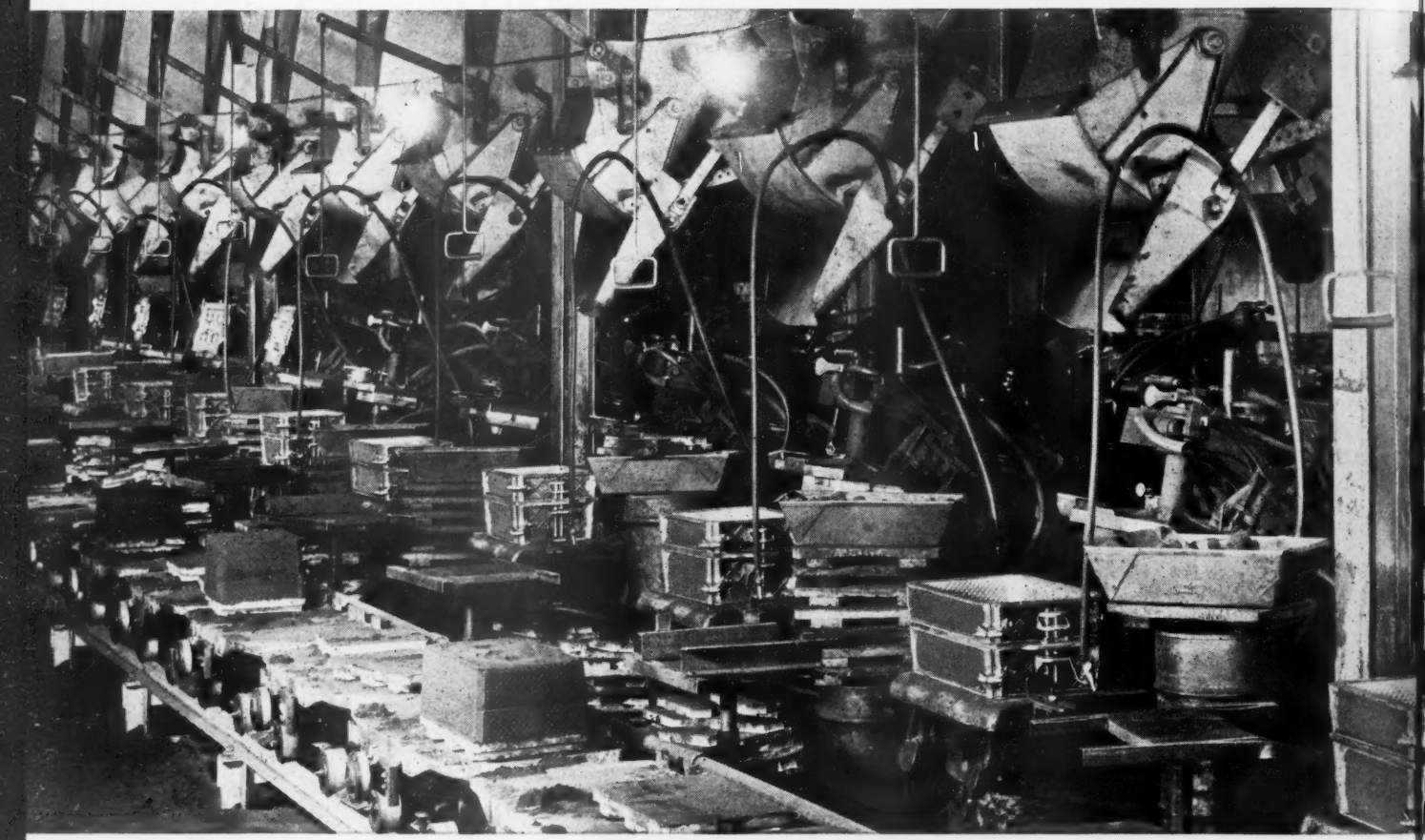
FOURTEENTH annual Old Timers and Apprentice dinner was held by Wisconsin Chapter of the AFS on May 8. There are now about 120 Old Timers, with 14 new members being added this year. Of the total, 79 were present at the meeting.

Prizes were awarded to winners of the chapter's apprentice contest. Winners are: Wood patternmaking—John Urban, Allis-Chalmers, and Ronald Raether and Ruber Navarro, Bucyrus-Erie Co.; Gray iron molding

(*Continued on page 200*)

WISCONSIN Chapter of the AFS held its 14th annal Old Timers and Apprentices Dinner on May 8 and also welcomed incoming officers. Left to right, top, Joseph G. Risney, Risney Foundry Supply Co., retiring president, turns over the gavel to President-elect A. F. Pfeiffer, A-C Mfg. Co., and is in turn presented with a past president's ring by Past President D. C. Zuege, Sivyer Steel Castings Co. Below, left to right, rear, are Wisconsin Chapter apprentice contest winners Albert Waltz, metal patternmaking, and Donald Tetzlaff, nonferrous molding. In front row are, left to right, John Urban, wood patternmaking winner; J. R. Van Kooy, foundry instructor, Milwaukee Vocational School, and Richard Petri, ferrous molding winner. On far right is 92-year old Robert Ziebell, Universal Foundry, Oshkosh, Wis., oldest of old timers present. Photos are by courtesy of Walter V. Napp, Delta Oil Co.

OSBORN SQUEEZERS



Portable and stationary models, cantilever or post type heads, squeeze pistons 10 to 18 inch diameters, wide range of table sizes—you'll find the one unit in the Osborn line of Jolt Squeezers that best meets your specific needs.

And, whatever your choice, you're assured the accuracy, economy and ease of operation that have made Osborn Jolt Squeezers the production standard of the foundry industry.

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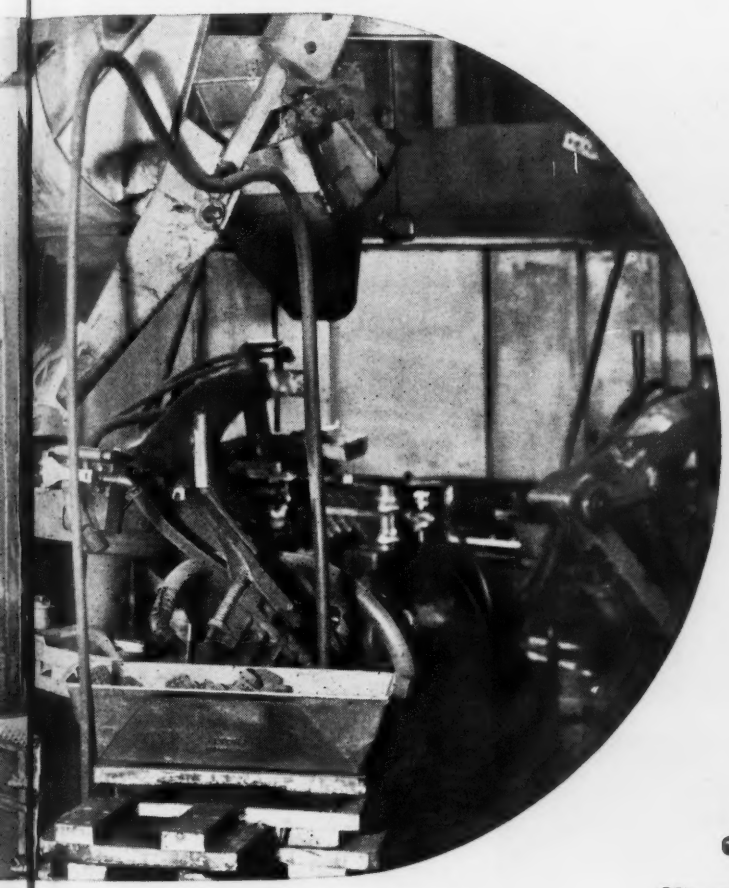
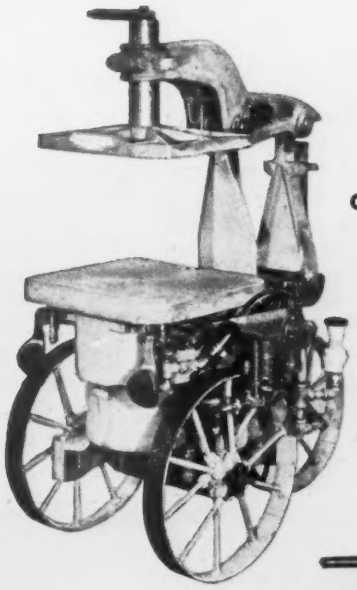
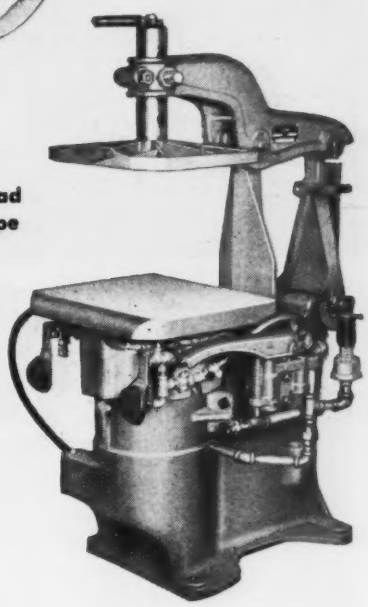
A SIZE AND TYPE FOR EVERY PRODUCTION NEED....

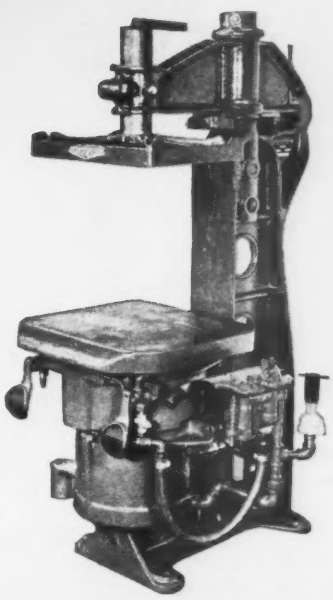




Cantilever Head
Portable Type



Cantilever Head
Stationary Type



Stationary
Post Type

STANDARD EQUIPMENT

Osborn Jolt Squeezers are furnished complete with Vibrator having chrome plated bore, Blow Gun and Automatic Squeeze Pressure Release Valve for automatically maintaining a pre-determined squeeze pressure on each mold.

OSBORN®

MOLDING MACHINES

CORE BLOWING MACHINES

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

(*Continued from page* 197)

—Richard Petri, Vilter Mfg. Co., Ted Iwanski, Allis-Chalmers, and Heinz Jobst, Harnischfeger Corp.; Steel molding—Howard Jubeck and David Thompson, Falk Corp., and Richard Benier, Bucyrus-Erie Co.; Metal patternmaking — Albert Waltz, Allis-Chalmers; Nonferrous molding — Donald Tetzlaff and Sylvester Schuh, Allis-Chalmers.

Ben Drews, who started work in the foundry at the age of 13 and is still active 62 years later with Zenith Foundry Co., had the following to say to the young men:

"I feel the foundry business is one of the most fascinating games a young man can get into. If you want a demanding trade, the foundry is the place to find it."

Officers for the 1953-54 chapter year were introduced: President, Albert Pfeiffer, superintendent of the pattern division, Allis-Chalmers Mfg. Co.; vice president, Robert Osborne, Lakeside Malleable Castings Co., Racine; secretary, Charles Fuerst, assistant foundry superintendent, Falk Corp.; and Leonard Gratz, vice president, G. & C. Pattern Works, re-elected treasurer.

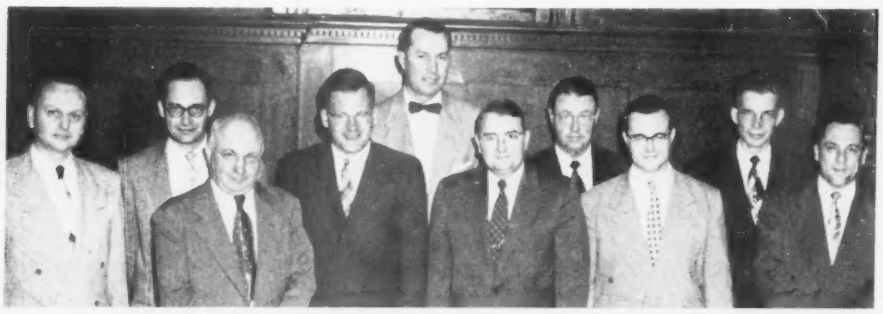
Total attendance at the meeting was 269, all of whom enjoyed the floor show which concluded the meeting. —*John E. Hubel*

Central Indiana

THERE were 140 members of Central Indiana Chapter of the AFS present at the May meeting which honored the chapter's past chairmen and two presidents of national foundry organizations. Robert Langsenkamp, Langsenkamp-Wheeler Brass Works, newly elected president of the Non-Ferrous Founders' Society, and I. R. Wagner, Electric Steel Castings Co., president of the AFS, also served as chairmen of the Central Indiana Chapter.

New officers were elected as follows: Chairman, Dallas Lunsford, Perfect Circle Corp.; vice chairman, Fred E. Kurtz, Electric Steel Castings Co.; secretary, J. A. Barrett, National Malleable & Steel Castings Co.; and treasurer, Lee Edwards, A. P. Green Fire Brick Co.

Harold C. Weimer, Beardsley & Piper Division, Pettibone Mulliken Corp., presented the film "Foundry Mechanization" in which methods to increase production and effect cost savings are illustrated.—*William H. Faust, Electric Steel Castings Co.*



CENTRAL INDIANA Chapter of the AFS elected the new officers shown in the top view at its May meeting. Left to right are C. T. Marek, Purdue University, director; W. E. Boyd, Mexico Refractories, director; N. E. Baker, Nonferrous Foundries Inc., director; F. E. Kurtz, Electric Steel Castings Co., vice chairman; A. Evans, International Harvester Co., director; Dallas Lunsford, Perfect Circle Corp., chairman; Lee Edwards, A. P. Green Fire Brick Co., treasurer; T. W. Teetor, Swayne-Robinson Co., director; J. A. Barrett, National Malleable & Steel Castings Co., secretary; and Fred Schwier, Federal Foundry Co., director. Lower left, left to right, are Technical Chairman B. E. Gavin, National Malleable & Steel Castings Co. and Speaker Harold G. Weimer, Beardsley & Piper. Past chairmen at lower right, left to right, include J. P. Lentz, International Harvester Co., 1944-45; Carl O. Schopp, Link Belt Co., 1952-53, and Allen J. Reid, General Refractories Co., 1951-52. Photographs are by courtesy of Henry Yeager, International Harvester Co.

Central New York

OFFICERS for the coming chapter year were elected at the May meeting of Central New York Chapter of the AFS. Newly elected chairman is John Feola, Crouse-Hinds Co., Syracuse, N. Y.; Joseph Gibson, Sweets Foundry, Johnson City, N. Y., is vice chairman; James O. Ochsner, Crouse-Hinds Co., is secretary; and William Mader, Oberdorfer Foundries Inc., Syracuse, is treasurer.

Directors elected to serve three years are: R. W. Colloggi, Goulds Pumps Inc., Seneca Falls, N. Y.; Harold Brakeman, City Pattern Works, Syracuse; James Palmer, Ingersoll-Rand Co., Painted Post, N. Y. Don J. Merwin, Oriskany Malleable Iron Co., Orinskany, N.Y., retiring chairman, will serve as director for one year.

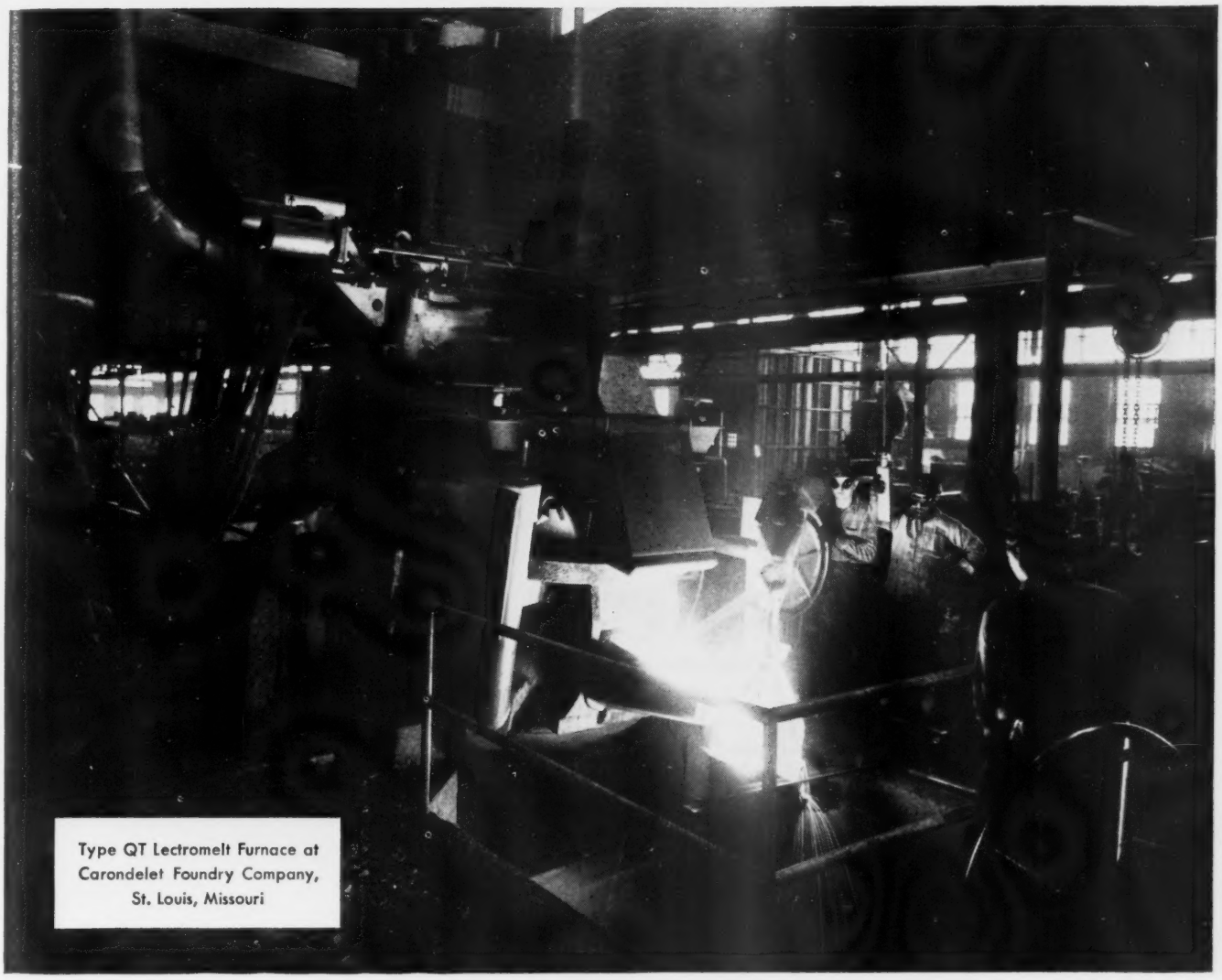
Principal speaker was John Ludwig Jr., service manager, Electro Metallurgical Co., who discussed gray iron metallurgy from the standpoint of metallurgical control in the foundry. Mr. Ludwig pointed out that carbon imparts castability to the iron and in the form of graphite gives machinability. Silicon, on the other hand, is a stiffener. He divided gray iron into three types: The high carbon iron used for medium to thin section work; the intermediate carbon types which are most widely used; and the high-test irons. He pointed out the advantages and disadvantages of each type.—*Harold Brakeman, City Pattern Works.*

Cleveland Non-Ferrous

MEMBERS of the Cleveland Chapter of the Non-Ferrous Founders' Society turned out in force to the Apr. 30 meeting to hear a discussion of "What the Purchasing Agent Expects from the Nonferrous Foundry" in regard to delivery, quality control and inspection practices.

George Elliot, W. J. Schoenberger Co., spoke on inspection problems and the expense to the customer in scrap-

(*Concluded on page* 203)



Type QT Lectromelt Furnace at Carondelet Foundry Company, St. Louis, Missouri

"Our *Lectromelt** Furnace gives us the Versatility needed in our jobbing foundry"

"Top-charging doesn't give our Lectromelt Furnace much time to loaf, boosting its productive time and holding down labor costs," reports Carondelet Foundry Company.

"Its versatility lets us shift easily from one type product to another . . . from high strength gray irons for pressure castings, to special steels for heat resistance, corrosion and abrasion resistance. In 10 minutes we make a spectrographic, prepouring analysis, permitting us to adjust each heat to meet specifications.

"Our Lectromelt Furnace is new, but already it's proved its worth."

If your business involves melting, smelting, refining or reduction, it will pay you to investigate what Lectromelt Furnace Equipment will do for you. For Catalog No. 8, write: Pittsburgh Lectromelt Furnace Corporation, 314 32nd Street, Pittsburgh 30, Pa.

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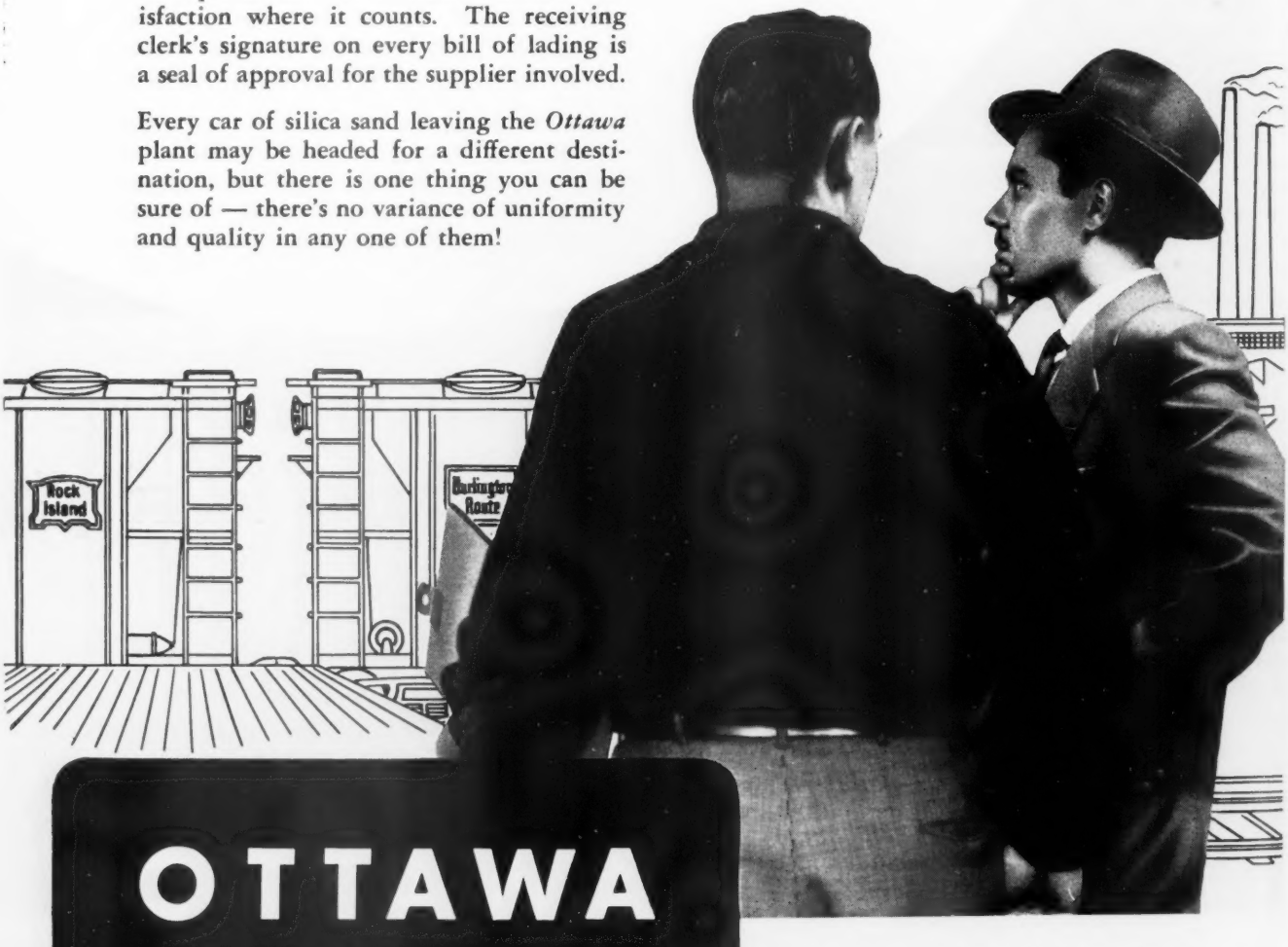
OTTAWA

History-making significance? No. Important quotation? Yes. Here's customer satisfaction where it counts. The receiving clerk's signature on every bill of lading is a seal of approval for the supplier involved.

Every car of silica sand leaving the *Ottawa* plant may be headed for a different destination, but there is one thing you can be sure of — there's no variance of uniformity and quality in any one of them!



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PLANTS AT OTTAWA, ILL. AND ROCKWOOD, MICH.

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SERVING THE GLASS, FOUNDRY, AND CERAMIC INDUSTRIES FOR OVER 50 YEARS!

(*Concluded from page* 200)

ping a casting after it has been set up on a machine and partially machined. He stated that porosity is one of the biggest problems since it usually ruins expensive cutting tools during machining. He stressed the need for closer co-operation between the foundry and the customer, and the need generally for closer supervision and inspection practices.

Robert Hoffman, Thompson Products Inc., discussed design and machining of castings. He believes that foundries should consider redesigning patterns for today's new machines and high production rates. He also stressed the need for closer co-operation between foundries and customers.

Arthur Grant, Jack & Heintz Co., spoke on delivery problems encountered by the customer. He stated that the purchasing agent usually allows plenty of lead time in buying castings so that after the order is in and machined all rejects can be remade and the customer can meet his delivery date.

The chapter's May 21 meeting concluded the chapter program for the year. Speaker was Maurice Mandle, Compliance Division of NPA, who described the new Defense Materials System which replaces the Controlled Materials Plan.

James M. Black, director of public relations, Associated Industries of Cleveland, talked on collective bargaining on the wage front with particular reference to demands made in Cleveland foundries. —*Walter O. Larson Jr., Grafton Foundry Co.*

Ohio State

A movie on shell molding was presented by F. R. Schultz, Material Handling Systems Inc., Detroit, at the Apr. 7 meeting of Ohio State Student Chapter of the AFS. He then discussed molding machines for the shell process and related materials handling problems.

On Apr. 22 a number of the chapter's members were guests at the Malleable Founders' Society informal dinner meeting held at the Ohio Union to discuss "Opportunities in the Foundry Industry."

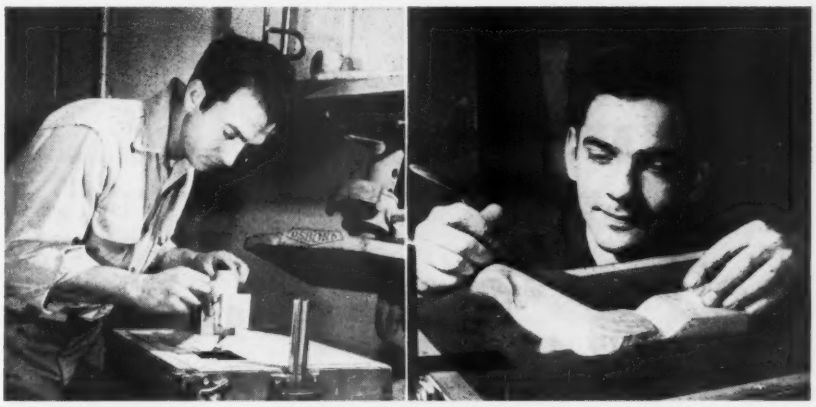
Saginaw Valley

MEMBERS of Saginaw Valley Chapter of the AFS were considerably interested in the talk of Morris Bean, Morris Bean Co., Yellow Springs, O., at the May 14 meeting held at Frankenmuth, Mich.

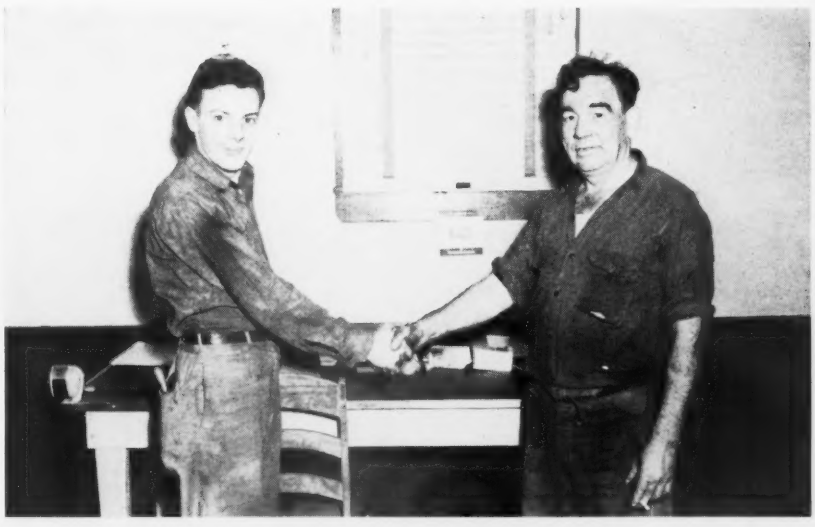
In his talk, "Progress and Precision Castings," Mr. Bean described several methods of making precision castings in both ferrous and nonferrous foundries. Precision castings are being produced for torque converters, jet engines, and electronic equipment. This illustrates that the demand for the process has increased tremendously with the development of these fields during the past ten years. Mr. Bean's display of precision castings as well as some slides of statuary and dimensional charts aroused much interest.

Officers elected for the coming year are: Chairman, F. James McDonald, Central Foundry Division, General Motors Corp.; vice chairman, Woodrow W. Holden, Eaton Mfg. Co.; secretary, Fred P. Strieter, Dow Chemical Co.; treasurer, Lenwell A. Cline, Saginaw Foundries Co.

Newly elected directors include: Roy W. Foster, Bay City Foundry Co.; Howard U. McClelland, Eaton Mfg. Co., and retiring chairman Kenneth H. Priestley, Vassar Electroloy Products.— *Roy S. Dahmer, Eaton Mfg. Co.*



NONFERROUS MOLDING PRIZE WINNERS: Two apprentice molders from AiResearch Mfg. Co., Los Angeles, won first and second prizes in the nonferrous molding division of the national apprentice contest of the AFS. Left to right, they are Joseph LoPatriello and Carlos Gonzales, respectively. Both had already won the same rankings in the Southern California Chapter's contest. Mr. LoPatriello won a complete tool box and $25 regionally in addition to the $100 national prize and an all-expense trip to the Chicago convention. Mr. Gonzales won a regional prize of molding tools and $15 as well as his national certificate



APPRENTICE CHAMPION: First prize winner in the steel molding division of the AFS apprentice contest this year, Robert J. Luckenbill, left, Dodge Steel Co., Philadelphia, is congratulated by Clayton McKinley, chairman of the shop committee, International Molders and Foundry Workers Union, AFL. Prizes included $50 from the Philadelphia Chapter of the AFS and a trip to the 1953 AFS convention in Chicago, where President I. R. Wagner awarded a $100 prize from the national society

Industry Briefs

UNITED Engineering & Foundry Co.'s New Castle, Pa., plant recently celebrated its tenth anniversary with a dinner for employees and an openhouse for the public. Ten-year pins were given to 683 employees who started with the company in 1943. New Castle joined the celebration by placing an 8-ft greeting card on the public square. Many store windows displayed banners extending birthday wishes.

* * *

New Haven Vibrator Co., 131 Chestnut St., New Haven, Conn., has changed its name to the Branford Co. to insure association of the company with its vibrators, which have borne the Branford name since 1915. The company is now headed by Arthur H. Jones, Maurice Gregoire and the officers of Johns-Hartford Tool Co. David E. Rausch, retiring general manager, is staying on as a consultant for a period of time.

* * *

Russell Pipe & Foundry Co., P. O. Box 112, Alexander City, Ala., suffered damage estimated at over $500,000, May 15, when fire destroyed its buildings.

C. & G. Foundry & Patterns Works, 2440 Yandes St., Indianapolis 5, has acquired patterns, machinery and all physical assets of McNamara Castings Co., 410 South Pennsylvania Ave., Indianapolis 4. Operations of the McNamara company, in business for over 50 years, will be moved to the C. & G. foundry. Bushing castings, gear blanks and similar items produced by McNamara will be added to C. & G.'s brass, aluminum, pattern shop and iron foundry work.

* * *

Electro Refractories & Abrasives Corp., Buffalo, has developed a process for the manufacture of a line of carbon-bonded, silicon carbide crucibles with capacities to 1100 lb of aluminum, or more of heavier metals. The process is said to impart a laminated structure that increases crucible strength and flexibility.

* * *

Harold E. Pridmore, foundry analyst specializing in pattern equipment, molding problems, special molding machine design and automatic cycle control, has changed his address from Hinsdale, Ill., to P. O. Box 137, Palo Alto, Calif.

OPEN HOUSE was held Apr. 17-22 at Koehring Southern Co.'s new plant, Chattanooga, Tenn., subsidiary of Koehring Co., Milwaukee. Each day was devoted to tours for special groups of guests, including local civic and industrial groups, publishers, employees and general public, equipment users and company distributors. An equipment exhibit, shown above, of parent and subsidiary company products was featured during the opening

National Malleable & Steel Casting Co., Cleveland, plans an expansion program estimated at over $800,000 at Tempe, Ariz., where it has been constructing a $1,600,000 foundry on a tract acquired last year. The new addition will include another foundry building, second office building, employment office, and first aid unit.

* * *

Clark Equipment Co., Industrial Truck Division, Battle Creek, Mich., made the Christy Equipment Co., 2056 Farnam St., Omaha, Neb., a new dealer for the company's fork lift trucks, powered hand trucks and industrial tractors. The Omaha dealership replaces that of Sioux Falls, S. D. and includes all of South Dakota and parts of Iowa, Nebraska and Minnesota.

* * *

Hickman, Williams & Co. has been appointed sales representative for the Woodward Iron Co., Woodward, Ala., in the marketing of its pig iron in Ohio, Illinois, Indiana, Michigan, Wisconsin, Minnesota, Missouri, Iowa, Oklahoma, Kansas, Nebraska, West Virginia, Pennsylvania, Delaware, New Jersey, New York and the New England states.

* * *

Howard Foundry Co., Chicago, has purchased a permanent location for its investment casting division at 5100 North 33rd St., Milwaukee. The firm bought the building and land for approximately $250,000 from S & M Mfg. Co. Howard hopes to double its investment casting production in the new 30,000 sq ft plant

* * *

Monsanto Chemical Co.'s Plastics Division, Springfield, Mass., is making its third expansion in less than a year in the field of phenolic resins for shell molding and laminating applications. The expansion will add about 15 per cent to the division's operations at Port Plastics, O., and Springfield, Mass.

* * *

Central Pattern Works, manufacturer of wood and metal patterns at 1109 East Pratt St., Baltimore, is equipping a nonferrous foundry at 47 W. West St., Baltimore. Two gas-fired melting furnaces are being installed.

* * *

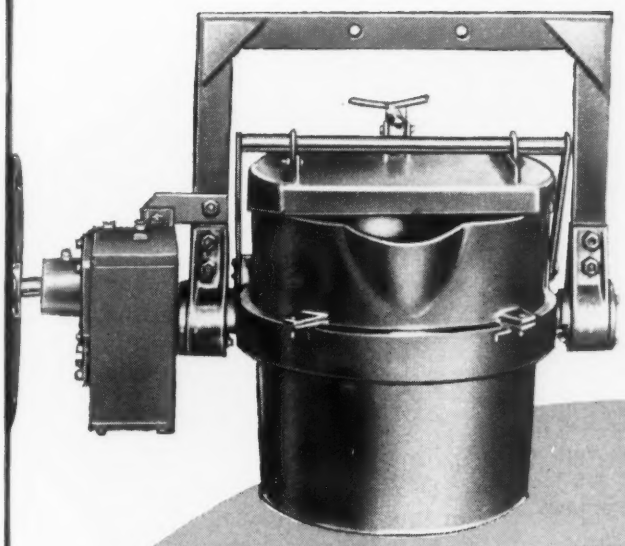
Elkhart Metal Products, 2425 De Camp Ave., Elkhart, Ind., suffered fire damage estimated at $50,000 on June 1 when metal believed to contain magnesium burst into flames, destroying the interior of the factory.

* * *

N. Ransohoff Inc., equipment manufacturer, has moved from Cincinnati to North Fifth and Ford Blvd., Hamilton, O.

WHITING

LADLES



COVERED TROLLEY LADLES—Heavy steel plate bowls; air cooled trunnions for trouble free operation. Anti-friction bearings. Improved design minimizes hand-wheel loads. Furnished with or without covers. Capacities (Iron) from 465 to 1400 lbs.

more
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Whiting Ladles, built to meet your special requirements, provide outstanding *exclusive* advantages. Each is designed for greater accuracy and safety, easier control, lower maintenance and longer life.

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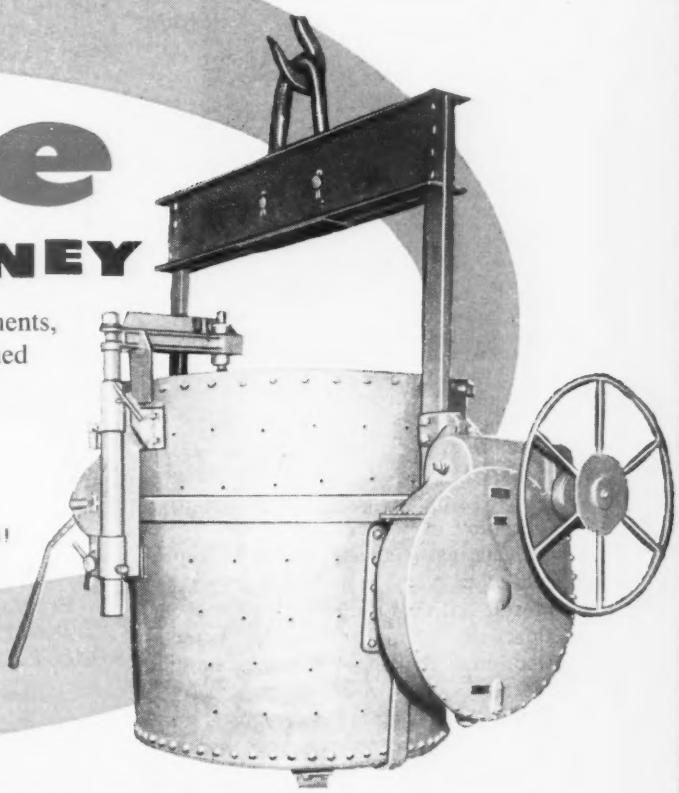
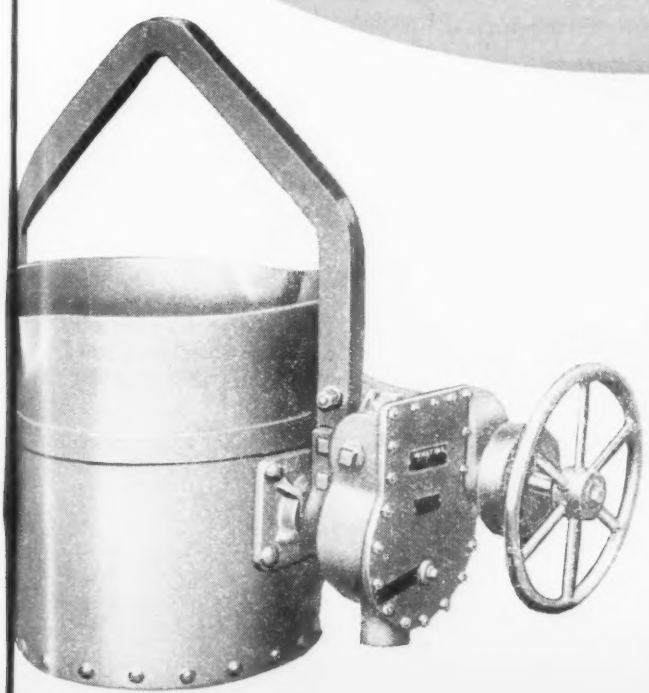
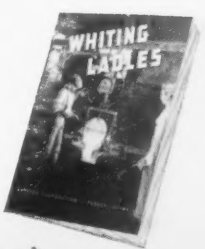
A WHITING LADLE TYPE FOR EVERY POURING JOB!
OVER 200 STYLES AND SIZES!





GEARED BOTTOM-TAP LADLES FOR SAFE, EASY POURING—Square bail, equipped with "5-Position" bottom tap rig or "Rack Type" rig. Ruggedly constructed of heavy steel plate, lapped and riveted seams, reinforced with steel bands placed above the trunnions and on the bottom of the bowl. Three supporting feet are also provided on ladle bottom. Capacities (steel) 8,925 to 48,975 lbs.

RIVETED CRANE LADLES—Taper side with V-bail. Seams riveted with flattened heads inside for easier lining. Steel reinforcing belt placed above trunnions which are formed by steel shafts, pressed and welded to large cast steel bases. Overlapping flanges protect journal boxes against spill. Capacities (Iron) from 805 to 8530 lbs.



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OBITUARY

ARTHUR J. Tuscany, 59, head of Arthur J. Tuscany Organization, and executive secretary-treasurer, Foundry Equipment Manufacturers' Association, Cleveland, died June 5. Mr. Tuscany was born and educated in Cleveland, and early in his career was associated with Johns-Manville Inc. and Whitney Tractor Co., Cleveland, in sales and executive work.

In 1922 Mr. Tuscany was appointed secretary-manager of the old Ohio Foundries Association and in 1928 was made executive secretary of the newly formed Gray Iron Institute, now the Gray Iron Founders' Society. In 1935 he resigned to establish his own

ARTHUR J. TUSCANY

organization for association management and related business consulting. At that time he was elected executive secretary of FEMA.

Other associations which he represented at various times included the Metal Lath Manufacturing Association, the Foundry Supply Association, and the Steel Kitchen Cabinet Manufacturers' Association.

Mr. Tuscany was active in a number of association and trade organizations, including the American Foundrymen's Society, American Society for Testing Materials, American Standards Society and American Trade Association Executives.

Last year his son, Arthur J. Tuscany Jr., joined him in the Arthur J. Tuscany Organization.

* * *

Jacob F. Parliment, 73, president-director, William Bartley & Sons Foundry, Bartley, N. J., died May 19. He had been with the company since 1896, became general manager, and treasurer in 1914.

* * *

Arthur O. Hinz, 58, secretary-treasurer, General Malleable Co., Waukesha, Wis., died recently in New Mexico.

David J. Vail, 52, since 1948 vice president-sales, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., died May 18. A native of Ontario, Canada, Mr. Vail went to Muskegon in 1920 and was associated with Continental Motors Corp. until 1930 when he joined the foundry company as an experimental engineer. He became sales manager in 1945 and general manufacturing manager of the company's Muskegon plants in 1946. Mr. Vail was instrumental in developing the cast camshaft, a revolutionary advance in the automotive industry.

* * *

Samuel H. Jasper, 62, for 45 years associated with Penton Publishing Co., Cleveland, died in Pittsburgh June 8. Mr. Jasper joined the company in 1907. In 1915 he was named manager of the Pittsburgh office where for many years he handled advertising sales for FOUNDRY and other Penton publications.

* * *

George E. Bryant Sr., 75, founder and chairman of the board, Oil City Brass Works Inc., Beaumont, Tex., died May 14. Mr. Bryant worked for Beaumont Iron Works for 18 years and in 1916 purchased Oil City Brass Works, adding the present foundry and machine shop in 1920.

* * *

Michael J. Connolly, 67, for 16 years foundry superintendent, Pratt & Letchworth Co., Buffalo, died May 27. He was foundry foreman, American Steel Foundry and General Steel Casting Co., Chester, Pa., prior to moving from there to Buffalo in 1936.

* * *

Franklin Lawrence, 71, since 1924 president, Portland Stove Foundry Co., Portland, Me., died Apr. 26.

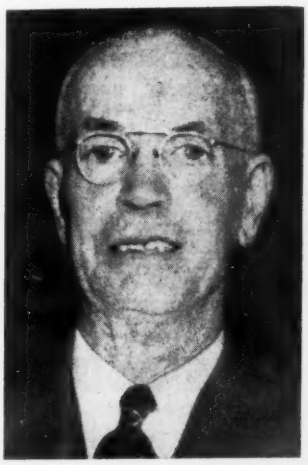
JAMES M. FITZWILLIAM

Vice president, Foundry Equipment Co., Cleveland, who died May 7, as reported in June FOUNDRY

George W. Mitsch, 58, operating manager of foundries, American Car & Foundry Co., St. Louis, died Apr. 29. Mr. Mitsch joined the company in 1913 as a patternmaker and became operating manager in 1945. He served twice as president of the St. Louis Foundrymen's Club which became a chapter of the American Foundrymen's Society during his last tenure.

* * *

George Johnstone Sr., who in 1951 retired from Johnstone Foundries Inc., Grove City, Pa., died May 2. Mr. Johnstone, a native of Scotland, entered foundry apprenticeship at 11 years of age, and later became a



GEORGE JOHNSTONE SR.

master foundryman. He came to the United States in 1923 and was associated with various foundries until 1947 when he joined his son who had organized Johnstone Foundries the previous year.

* * *

Horace S. Rawdon, 44, secretary-treasurer, Carondelet Foundry Co., St. Louis, died there May 5. Mr. Rawdon joined the company 10 years ago.

* * *

Henry Siplon, 59, manager of Plant No. 4, Campbell, Wyant & Cannon Foundry Co., Muskegon, Mich., died May 16. Mr. Siplon had been associated with the company 40 years.

* * *

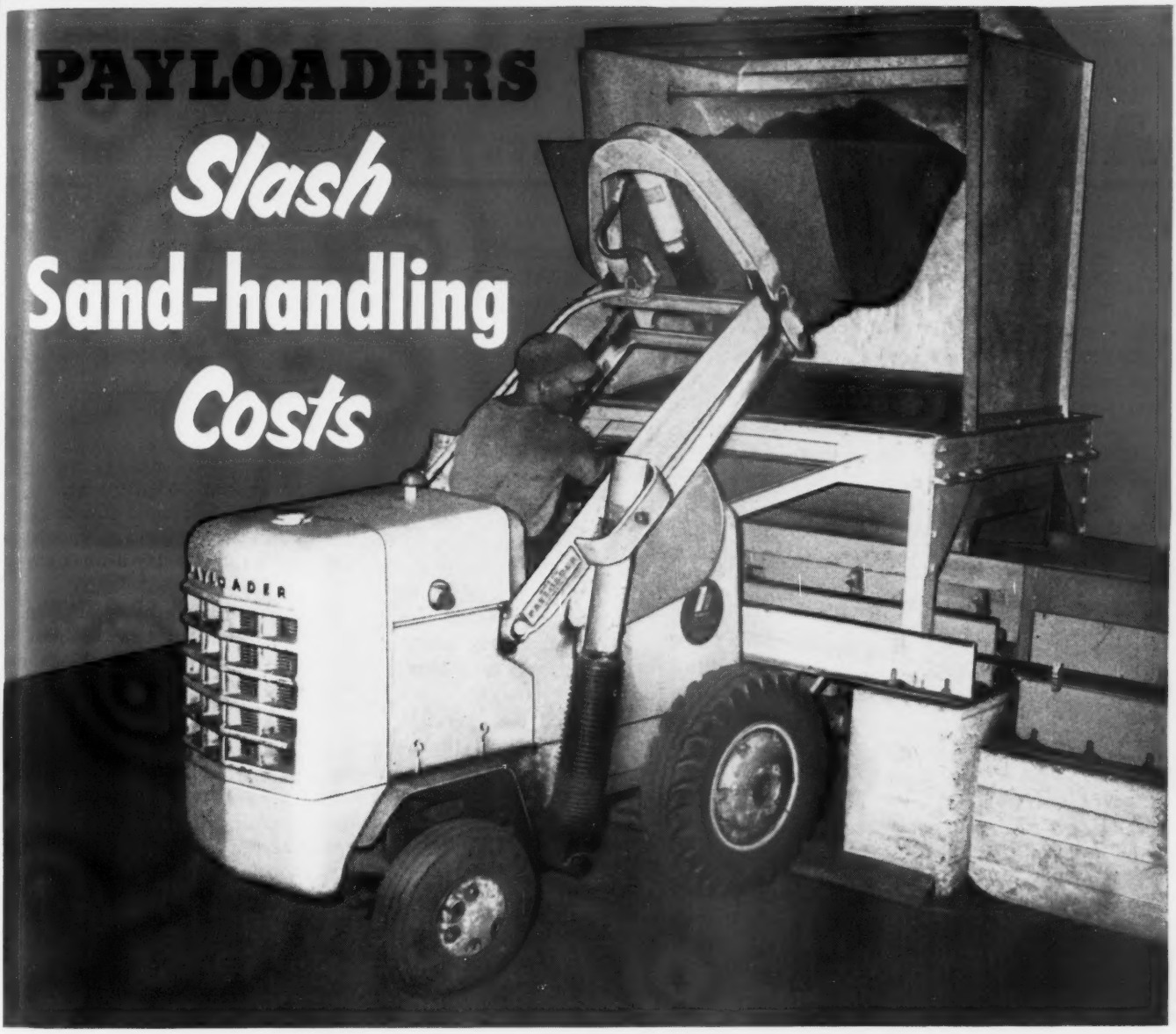
Edward C. Badeau, 58, in charge of the special publications section and editor of *Inco Magazine,* International Nickel Co., New York, died May 24. He joined the company in 1929.

* * *

William M. Whitney, president-treasurer, Baxter D. Whitney & Son Inc., Winchendon, Mass., died May 1.

* * *

Ira C. Fennell, purchasing agent, National Roll & Foundry Co., Avonmore, Pa., died May 2.



In hundreds of foundries "PAYLOADERS" have effected substantial reductions in sand-handling costs and eliminated many other laborious material handling jobs. These unusual tractor-shovels unload sand from boxcars, carry it to storage and mullers . . . deliver it to molding stations and core makers . . . scoop it from the pouring floors and clean-out rooms . . . return sand for reclaiming . . . windrow it for the cutter. Fast, nimble "PAYLOADERS" also save time, labor and costs on other jobs—handling small castings, slag, coke, coal, ashes, waste and snow. They work inside and outdoors on pavement or ground.

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Around the Country

NEWS REPORTS FROM

Chicago
Los Angeles
Philadelphia
New York

Chicago

IMPROVING quality of magnesium castings through statistical control and promoting safety in magnesium foundries were two important topics discussed at the annual meeting of the Casting Division of the Magnesium Association held at the Edgewater Beach Hotel, Chicago, May 26. The day's program, in which about 100 members and their guests participated, embraced a morning technical session, luncheon and an afternoon visit to the magnesium foundry of Howard Foundry Co.

Kurt S. Sealander, Aluminum Co. of America, Buffalo, who had made arrangements for the meeting, presided at the technical session. Participating also was the association's president, J. S. Kirkpatrick, director of research and development, Brooks & Perkins Inc., Detroit.

In the opening paper, M. E. Brooks, Dow Chemical Co., Bay City, Mich., emphasized that good housekeeping plays a most important part in safety in magnesium foundries. Fire hazards exist in melting, grinding and buffing. One precaution is to make sure that grinding dust from iron and steel isn't allowed to come in contact with magnesium dust, this to prevent conditions favorable to the familiar thermit reaction.

The speaker said that water must be running in the dust collector before grinding or buffing operations commence. Some foundries, he stated, use oil instead of water in dust collectors, and while this eliminates the danger inherent in wet sludge it introduces an oil hazard. Best method for disposal of dust collector sludge seems to be to burn it under controlled conditons. Discussion indicated there has been no research to determine the exact amount of moisture required in sludge to make it incombustible.

The matter of statistical quality control in magnesium foundries was expounded by A. J. Kukla, Aluminum Co. of America, Buffalo, who pointed out that in many industries manufacturing operations depend heavily on machines but in foundries so much depends on workmen. In a sand foundry, management must rely on the capabilities and performance of its men.

The speaker asserted that good incentive systems are based on quality as well as quantity performance. Many melting difficulties are found to stem from careless procedure and it is a good place to apply quality control. Sand and sand practice constitute another profitable area for application of control. For example, the method of adding binder in core sand sometimes varies widely and it can have profound effects as a cause of casting defects.

Mr. Kukla described the operation of statistical quality control in the foundry in considerable detail and through use of charts gave convincing evidence that use of control can prevent the production of considerable scrap.

Closing part of the technical session was devoted to a discussion of grain refinement of magnesium alloys. This stemmed from a paper—"Grain Refinement of Magnesium Sand and Permanent Mold Castings," which R. T. Wood, Aluminum Co. of America, Cleveland, presented at the association's annual meeting in New York last December. Mr. Wood led the discussion. It was obvious from those participating that satisfactory progress is being made in controlling grain size but that much further investigational work must be done before positive conclusions are possible.

New York

FOUNDRY operations are spotty, with a drop in the trend likely before business picks up. Due to vacations there will be a considerable lag during the first two weeks in July, and some foundrymen predict that business will not gain over the present level much before September, if then. They expect vacations to have a retarding effect on output for several weeks.

Gray iron shops are experiencing little real consuming pressure, and are maintaining an average operating rate of around 80 per cent. Their backlogs remain around two to three weeks. A few shops are unable to maintain a full five-day-a-week schedule.

Steel castings are being shipped at a faster rate than new business is being received. Hence backlogs are off considerably from earlier in the spring. Steel casting production is at normal capacity but backlogs are down to a point where deliveries can be promised within a month or so.

Nonferrous foundries appear to be holding their own. White metal shops continue very busy, with the brass and bronze shops averaging perhaps 75 to 80 per cent of normal. Captive shops are doing better than jobbing plants, despite the fact that a continued lag is noted in ship work which affects the captive plants more than the independent shops.

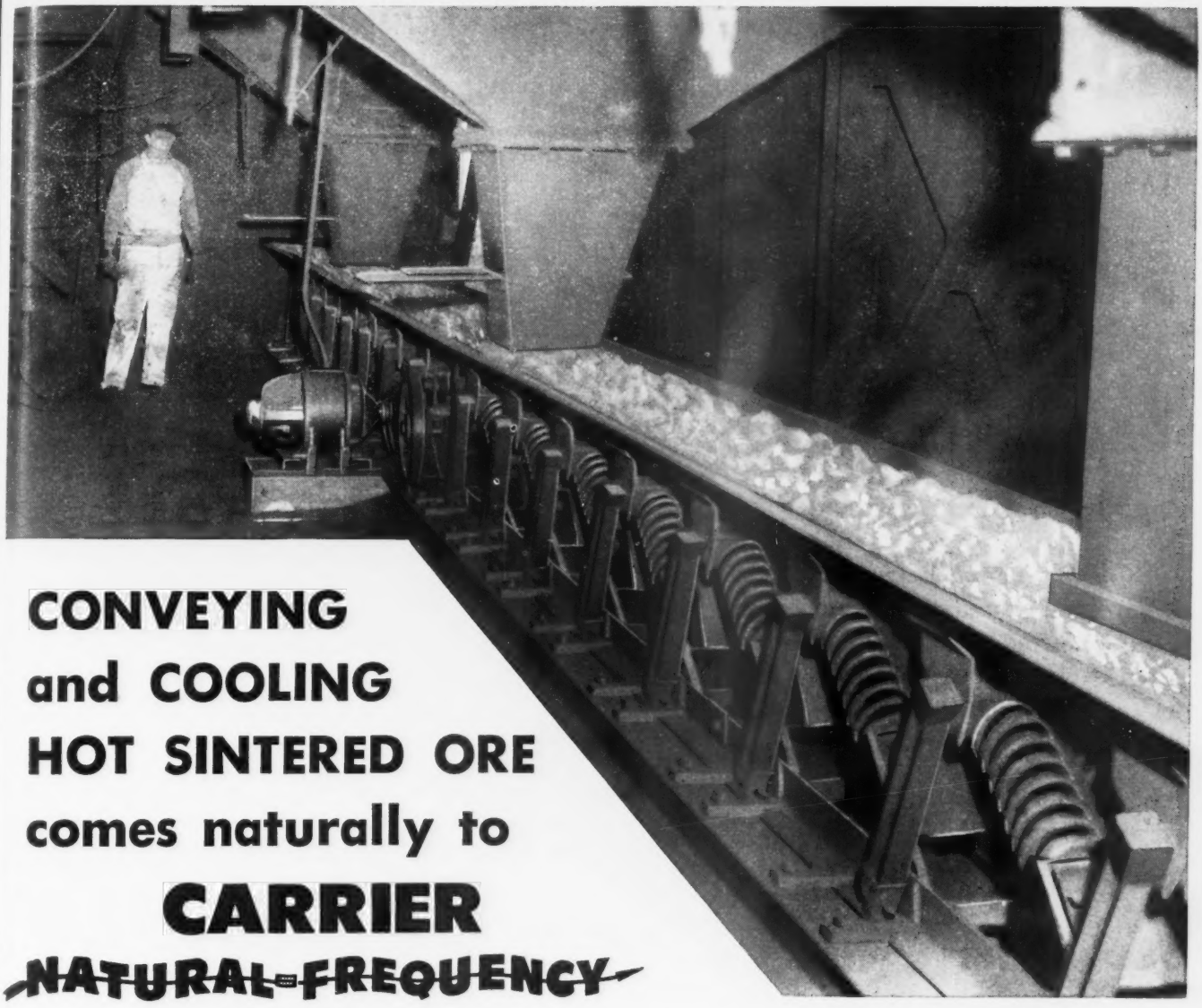
Raw materials generally are in good supply.

Los Angeles

AS A major part of a $65 million facilities expansion program, a third blast furnace at Kaiser Steel Corp., Fontana Works, Fontana, Calif., was blown in June 2, boosting the steelmakers' supply of hot-metal by 438,000 tons yearly. The blast furnace is the third on the Pacific coast and is expected to add to the supplies of pig iron already available to foundries.

There has been no shortage of pig iron for some time, say foundrymen, despite steel plants' greater usage of hot metal in steelmaking. Steelmakers have steadily reduced steelmaking scrap consumption as much as 75 per cent by using more pig iron in their charges. For the first four months of this year, compared with the like 1952 period, Torrance and Pittsburg

(*Continued on page* 210)



CONVEYING and COOLING HOT SINTERED ORE comes naturally to CARRIER ~~NATURAL-FREQUENCY~~ CONVEYORS

Carrier Natural-Frequency Conveyor in Alan Wood Steel Co. plant, Conshohocken, Pa.

Conveying and cooling up to 40 tons of hot sintered ore an hour is a "natural" for Carrier Natural-Frequency Conveyors. The 57-foot unit in Alan Wood Steel Company's Conshohocken plant, above, is powered by one 7½ H.P. drive and has a one-piece steel-plate pan, ½" thick. It receives the 700° (F.) ore from hoppers, then quickly vibrates it to storage with a gentle, abrasion-free motion. The conveying speed is 90′ per minute.

Notice that no water jackets are required for cooling — the conveyor's spring hangers have air-gap insulation spaces that not only cool the pan and ore, but also eliminate the possibility of corrosion and leakage!

And because of exclusive Natural-Frequency design, there's an absolute minimum of maintenance and down-time!

Hundreds of America's leading industrials are now using Natural-Frequency Conveyors and processing equipment for many hard-to-handle products — things like limestone, coke, mill scale and slag . . . cement clinker . . . castings . . . machine turnings . . . sand . . . minerals . . . plastics . . . bulk chemicals . . . food products. If *you* handle "tough" materials — anything hot, sharp, wet, abrasive, friable, brittle, stringy, jagged or oily — it will pay you to get the whole Natural-Frequency story. Mail the coupon, *today!*

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Frankfort Avenue at Clifton, Louisville 6, Ky.

Gentlemen: Without obligation, please send complete information on Carrier Natural-Frequency Conveyors.

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Att: Mr._____ Dept._____

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Manufacturers of Gas and Diesel Engine-Driven Generators and Air Conditioning Units; Gas and Diesel-Electric Power Units for Industrial Trucks

(*Continued from page* 208)

plants of Columbia-Geneva Steel Division, U. S. Steel, used 9.3 per cent less scrap. In April, scrap consumption was 26 per cent less than in April, 1952. The Division's Geneva plant is now a hot-metal operation altogether. With its new, greater supply of pig, Kaiser has withdrawn temporarily from the scrap market.

Proposals to cut Air Force appropriations $5 billion have so far left foundrymen unworried. Any reduction in aircraft production schedules, if it comes, will undoubtedly reduce potential business of aluminum and magnesium foundries rather than current production. Military backlogs of aircraft manufacturers are high and extend production through 1956.

Foundry activity is "rocking along" at last month's levels but the undertone to casting demand is soft. Some foundries report slight pickup in overall business volume at the expense of backlogs, trimmed to 30-60 days. Customers are exerting little pressure for delivery. Casting requirements of pump manufacturers have fallen off but demand from other interests are sustained. Work schedules are mostly five-day work weeks with little overtime. Supplies of all materials are good.

Higher wages for foundry workers are anticipated, based on the recent Pacific Northwest settlements. A feature of union activity is the drive by the United Mine Workers to organize the nonferrous foundries, mostly already under the AFL banner.

Philadelphia

GRAY IRON production managed to expand a bit in June before taking an anticipated drop in July because of vacation schedules. The June improvement has been general, applying to both captive and jobbing shops and to most sizes of castings within normal range. Backlogs now average around three weeks, against two to three weeks a month ago, and most shops are running around five days a week. Some trade leaders estimate operations as being around 90 per cent of normal, the highest point so far this year.

The first two weeks in July are expected to witness the sharpest dip due to vacations; however, vacation schedules will make themselves felt in one degree or another throughout July and August, foundrymen declare.

The relatively few malleable shops in this area are perhaps operating at

(*Concluded on page* 212)

Maintenance report from user of 13 Rotor Grinders:

"after 14 months COST $0.00"

THIS large manufacturer of electrical equipment has been using 13 Rotor B-35 Vertical Air Grinders for 14 months—two shifts per day, 6 days per week—for sanding, wire brushing and grinding. They report that not one cent has been spent for maintenance—no time out for repairs! And metal removal has been far greater than with other types of grinders . . . and their good balance make them popular with operators.

If you haven't seen these new Rotor Vertical Grinders in action, ask for demonstration today!

AIR O'TOOL

ROTOR VERTICAL SPECIFICATIONS

	B-35	*B-12*
Weight	10¾ lbs.	10 lbs.
Wheel Size	6" Cup	6" Cup
Pad Size	7" or 9"	7" or 9"
Speeds	6000, 5000, 4500, 3500	6000, 5000, 4500, 3500
Height	7½"	7"

For cup wheels, sanding pads, cut off wheels, wire brushing.

WRITE TODAY FOR BULLETIN No. 40

AIR HIGH CYCLE

THE ROTOR TOOL CO.

CLEVELAND, OHIO

UNBIASED ANALYSIS OF PORTABLE TOOL PROBLEMS

HAUSFELD

METAL MELTING **FURNACES**

FOR

BRASS—ALUMINUM—MAGNESIUM

AND ALL OTHER NON-FERROUS

METALS AND ALLOYS

GAS OR OIL FUELS

TILTING AND NON-TILTING TYPES

SINGLE AND MULTIPLE BURNERS

AUTOMATIC PROPORTIONING SINGLE VALVE CONTROL ASSURES UNIFORM RESULTS WITH MAXIMUM ECONOMY OF OPERATION.

The Campbell-Hausfeld Co.

300-320 MOORE ST. HARRISON, OHIO

(*Concluded from page 210*)

around 80 per cent of normal, with backlogs averaging two to three weeks. Steel foundries are operating at full capacity, but there is a pronounced drop in incoming business. Most steel shops can now promise deliveries within four to five weeks, as against eight to 10 weeks a month and a half or so ago. There has been quite a falling off in government business, it is said. Nonferrous shop operations are steady at around five days a week.

Raw materials are in adequate supply. This applies not only to such tonnage items as pig iron and scrap but to most nonferrous metals and alloys.

Show Production of Cast Iron Plumbing Fixtures

A 16-mm color-sound motion picture illustrating the manufacturing processes of vitreous china, enameled steel and enameled cast iron plumbing fixtures has been produced by Universal-Rundle Corp., New Castle, Pa., and is available for trade showings.

Called "New Horizons," the motion picture was produced in the company's plants in Redlands, Calif.; New Castle and Bristol, Pa., and Camden, N. J. The action covers processes used in all of Universal-Rundle's seven plants and in the W. Keith McAfee Research Laboratory. Complete information can be secured from the Sales Promotion Dept., Universal-Rundle Corp., New Castle.

Book Review

Symposium on Fatigue with Emphasis on Statistical Approach-II, paper, 91 pages, 6 x 9 in. Published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3. Price $2.

Contains four papers and discussion presented at a symposium held during the 1952 annual meeting of the American Society for Testing Materials, dealing, as the title indicates, with fatigue with special consideration from the statistical viewpoint. Papers and authors include: "Statistical Nature of the Fatigue Properties of SAE 4340 Steel Forgings" by J. T. Ransom and R. F. Mehl; "Statistical Behavior of Fatigue Properties and the Influence of Metallurgical Factors" by E. Epremian and R. F. Mehl; "New Interpretation of the Understressing Effect," by E. Epremian and R. F. Mehl, and "Fatigue Properties of Large Specimens with Related Size and Statistical Effects" by O. J. Horger and H. R. Neifert.

Birmingham Chamber of Commerce photo

Vulcan, mythical god of fire and metal, stands atop Red Mountain overlooking Birmingham. Weighing 60 tons, it is the largest iron statue in the world and second in size to the Statue of Liberty.

Birmingham

FOUNDRY MARKET AREA NUMBER SEVEN

The Birmingham area is distinguished by its high-production foundries that turn out tremendous quantities of pressure and soil pipe, fittings and similar products. Its 82 foundries, with slightly over 18,000 employees, produce better than a million tons of castings annually—third highest in the nation. 70 of the 82 foundries in the area are gray iron foundries, 38 employing 100 or more people. A large number of these foundries use ANNEALSHOT and/or SUPER-ANNEALSHOT because of the important economies obtained. Why don't you investigate these *better* abrasives? Just write **Metal Blast, Inc.,** 872 East 67th St., Cleveland 3, Ohio, for full information.

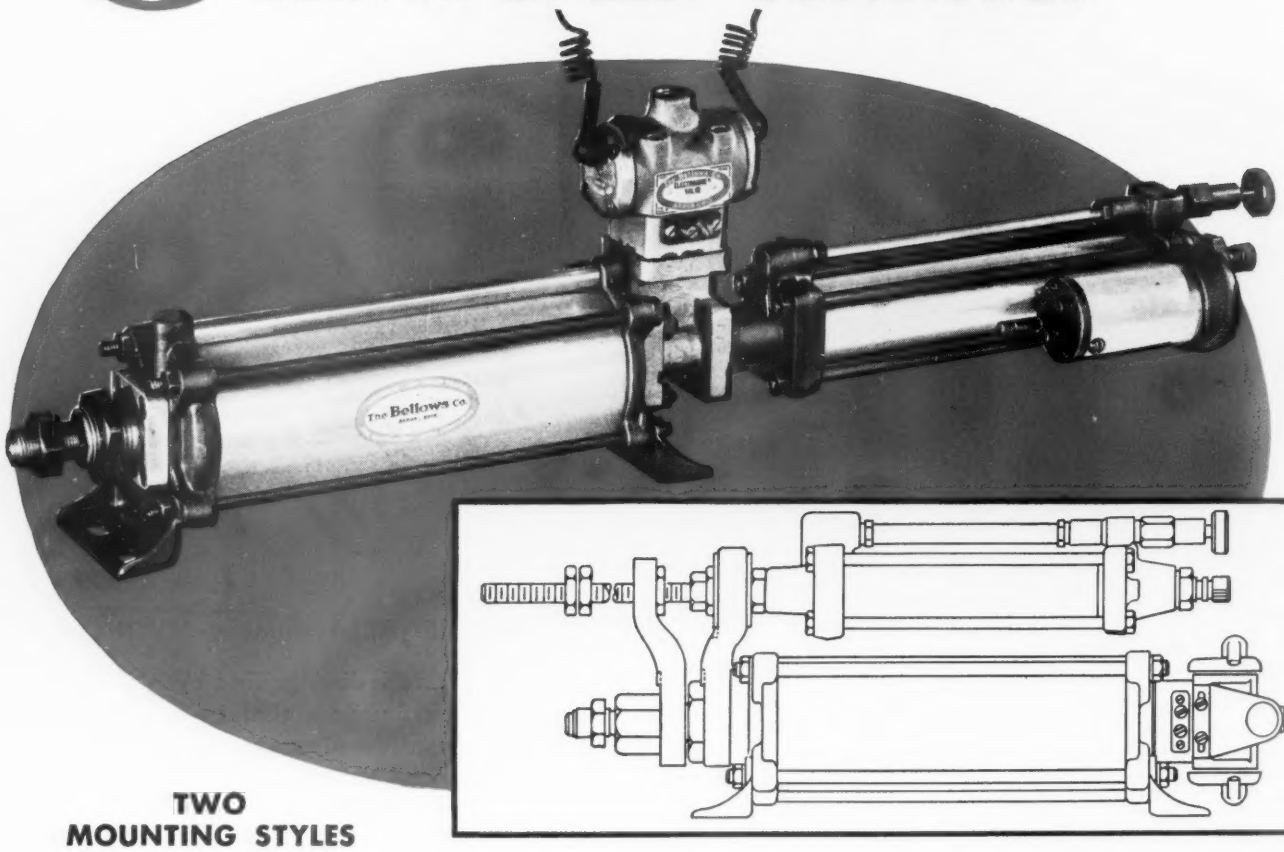
Statistics from Penton's HOW TO SELL THE FOUNDRY MARKET

ANNEALSHOT
chilled shot and grit
SUPER-ANNEALSHOT
malleable shot and grit

GUARANTEE: *If you don't find Metal Blast abrasives the best and most economical you've ever used—you may return the unused quantity for refund, at our expense.*

This Air Cylinder Combines

1 BUILT-IN HYDRAULIC CONTROL
2 BUILT-IN ELECTRIC CONTROL
3 BUILT-IN SPEED CONTROLS



TWO MOUNTING STYLES

The Bellows Air Motor and Hydro-Check (Model HCB-EM) is available arranged in tandem as shown above, or in parallel, as sketched.

●

Combination units of Air Motor and Hydro-Check are also made with any one of six other Bellows directional valve arrangements; and, of course, Air Motors and Hydro-Checks are available as separate units.

In one compact packaged power unit are built-in controls to cover every phase of air cylinder operation. Built-in hydraulic control of piston rod movement gives the characteristic smoothness of hydraulic operation, yet retains the speed and flexibility of air power. Built-in electrically controlled directional valve permits quick, positive, remote control, or easy electrical synchronization with other machine elements. Built-in speed controls permit exact control of piston rod speed in either or both directions.

This combination of Bellows Air Motor and Hydro-Check is available in five bore sizes: 1¼", 1¾", 2½", 3⅝" and 4½" in standard stroke lengths up to 18".

Here is air cylinder power at its best — fast, flexible, safe, and smooth.

BULLETIN CL-50 TELLS THE STORY. WRITE FOR IT TODAY!
DEPT. FO753

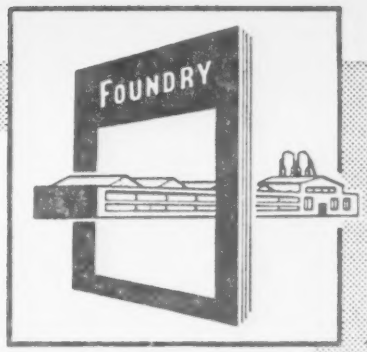
Controlled-Air-Power

The Bellows Co.

AKRON 9, OHIO

699-A

FOR FASTER, SAFER, BETTER PRODUCTION



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Our staff will forward this information to the advertiser immediately so you'll be relieved of the necessity of writing several letters. You'll hear from the advertiser directly, answering your request.

FOUNDRY
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FIRST CLASS
PERMIT No. 36
(Sec. 34.9 P.L.&R.)
Cleveland, Ohio

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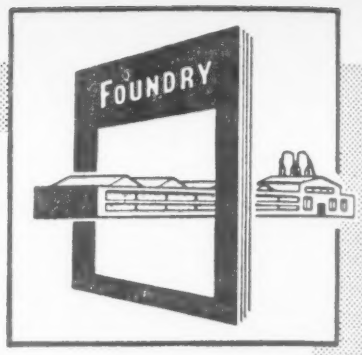

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YOUR NAME _____ TITLE _____

COMPANY _____

ADDRESS _____

CITY _____ STATE _____

7-53

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Our staff will forward this information to the advertiser immediately so you'll be relieved of the necessity of writing several letters. You'll hear from the advertiser directly, answering your request.

FOUNDRY
Readers Service

MELTRITE
PIG IRON

Making MELTRITE
Beginning of a cast of molten iron.

A STANDARD OF *Performance*

MORE USED THAN ANY OTHER MERCHANT PIG IRON

P M

70 years of service to industry

PICKANDS MATHER & COMPANY
UNION COMMERCE BUILDING • CLEVELAND 14, OHIO
CHICAGO • CINCINNATI • DETROIT • DULUTH • ERIE • GRAND RAPIDS
GREENSBORO • INDIANAPOLIS • MINNEAPOLIS • ST. LOUIS • WASHINGTON
IRON ORE • PIG IRON • COAL • COKE

INDUSTRY'S MATERIALS HANDLING MEN

Gain Ideas at Exhibitions and Conference

By ROBERT H. HERRMANN
Associate Editor

OVER 27,000 people interested in up-to-the-minute methods of handling industry's tremendous flow of materiel in transit and in production attended the fifth National Materials Handling Exposition at Philadelphia, May 18-22. They were rewarded with a display by 340 manufacturers that filled nearly six acres of exhibit hall space with the newest of materials handling equipment to form the largest industrial show in the country this year and the biggest ever to be conducted in Philadelphia.

The show was sponsored by the Material Handling Institute, an organization of handling equipment manufacturers, and conducted by Clapp & Poliak Inc., New York, founder of the show.

The Materials Handling Conference, held concurrently with the show, was conducted by the American Material Handling Society, composed of executives of companies which use materials handling systems. It consisted of discussion sessions on five basic aspects of materials handling: "Handling in Process," "Warehousing and Shipping," "Packaging for Improved Handling," "Bulk Handling" and "Requirements for Organization, Study and Analysis."

No formal papers were presented at the seminars, discussion being based on question and individual problem presentations from members of the group attending. Interest ran high in the exchange of information and experience so that discussion was lively during the three-hour morning sessions held each day of the conference, May 19-21.

One of the problems covered at the conference had to do with methods of segregating materials handling costs from total production charges. Firstly, materials handling functions have to be defined, and the consensus was that such operations are those in which the material or part is not changed or some processing operation performed on it. Those operations, then, should be observed by a time-study man so that their cost can be calculated.

Who should be responsible for the materials handling function in a plant? Experience of those attending the conference is that the job should be handled on the staff level so that the man in charge may have a better opportunity to view the situation from an overall cost viewpoint. There were some, however, who felt that the materials handling engineer could be either a staff or a line man. Those in both schools of thought agreed, though, that he should have complete cognizance of all plant functions because his operation must cross the paths of all departments. He should be responsible for handling, storing and transporting all material in the plant.

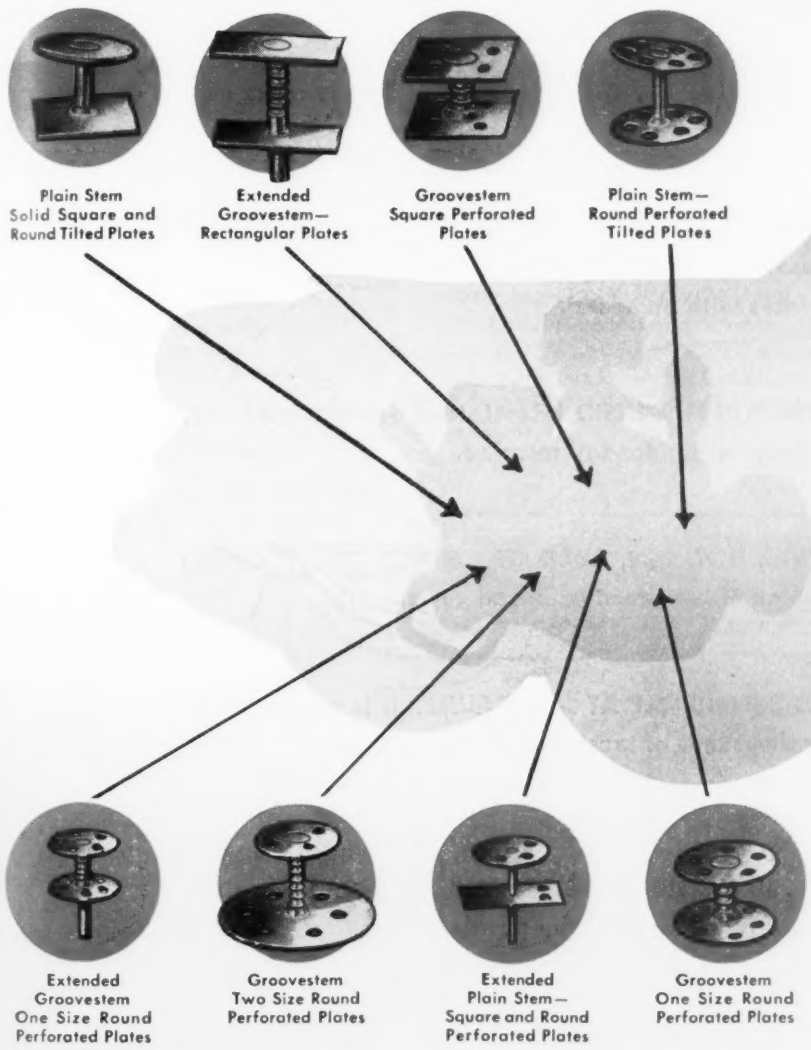
With the modern trend to automation, one of the newest problems of the materials handling engineer is in-process handling. It was felt that

(*Concluded on page* 221)

Big crowds, big exhibits and big equipment were much in evidence at this year's biggest industrial show

fine FANNER motor CHAPLETS

are used by more automotive manufacturers... in more locations... because of their outstanding record for producing sound, uniform castings


Plain Stem Solid Square and Round Tilted Plates
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Plain Stem—Round Perforated Tilted Plates
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Groovestem Two Size Round Perforated Plates
Extended Plain Stem—Square and Round Perforated Plates
Groovestem One Size Round Perforated Plates

Products that are used by automobile manufacturers must pass the most rigid of tests. This is especially true of products involved in the casting operation because this industry depends on a gigantic continuous flow of uniform sound castings which form the heart of every motor car. Here, there can be no compromise with quality because unsound castings mean product failure and production line breakdowns. It is significant that for the past 30 years more fine Fanner Motor Chaplets have been used by more automotive manufacturers for more different castings than all other types combined. The millions upon millions of fine Fanner Motor Chaplets that have become an integral part of almost every motor car manufactured in the United States are proof of the close precision tolerances maintained, and the uniform high quality of these Fanner products. Fine Fanner Motor Chaplets through their exclusive design, their positive core support, their accuracy of construction, their complete fusion help produce better castings...at lower costs...with fewer losses...yet they cost no more! Only a few of the wide range of Motor Chaplets made by Fanner are shown —get acquainted with the complete line of Fine Fanner Chaplets by writing today for your free copy of the Fanner Chaplet Catalog.

THE FANNER MANUFACTURING COMPANY

designers and manufacturers of fine FANNER CHAPLETS AND CHILLS

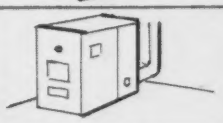
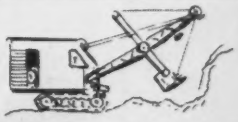
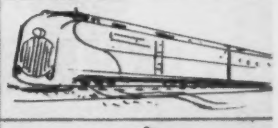
BROOKSIDE PARK **CLEVELAND 9, OHIO**

there are

fine **FANNER**

MOTOR CHAPLETS

for many other products

pumps	
stoves	
furnaces	
road machinery	
locomotives	
farm machinery	

YOU NEED THE BEST CORE WASH

Buy MEXADIP™

- **MEXADIP WILL NOT FERMENT.** You will not have to dump your wash because of hot humid conditions — no pock marks or pitted coating surfaces with MEXADIP.

- **MEXADIP STAYS IN SUSPENSION.** Let it stand over the week end, it will be ready to go Monday morning.

- **MEXADIP WILL NOT RUN, BUILD UP OR RUB OFF.** It applies equally well on either green or baked cores.

- **MEXADIP IS DEPENDABLE AT ANY BAUME.** It is applied daily to cores for thousands of tons of castings over a range of 10-40 degrees Baume.

- **MEXADIP REQUIRES NO LONG "PASTE" MIXING.** No waiting period is necessary. Just add the powder to water and after a few minutes of stirring it is ready to go.

IMPROVE CASTING APPEARANCE AND SAVE MAN HOURS IN THE CLEANING ROOM. If you have a problem with core wash, MEXADIP will solve it. Ask us to arrange a test today.

Why wait . . .
Start now — Use MEXADIP™

168

THE UNITED STATES GRAPHITE COMPANY

DIVISION OF THE WICKES CORPORATION • SAGINAW, MICHIGAN

(*Concluded from page* 218)

for proper fulfillment of the handling function the materials handling engineer should have assistance in solving problems of materials handling and plant layout from a team consisting of design, production, process, mechanical and tool engineers.

It also was pointed out that the purchasing agent should co-ordinate buying activities with the materials handling engineer. Buying the right type of material at the right time is important. Having huge quantities of materials laying around in storage can hamper proper handling and production functions. It was stated that the average cost of storing $1 worth of material for one year is 37 cents. Therefore it is foolish to try to make money by buying large quantities of material at a low price. Better buy at the current price and process the material as it is received.

Change the Design

To illustrate the benefits of co-operation on handling problems, a few examples were cited. One was the case of the 49-in. auto muffler that would have to be transported during processing in tote boxes 48 in. long. The materials handling engineer consulted the design engineer and discovered that the 49 in. merely was an arbitrarily selected length. So the muffler was shortened to fit the boxes. Then there was the washing machine that required installation and servicing of component parts on three sides. When the materials handling engineer consulted with design, tooling and production engineers changes were made, permitting installation and servicing from only one side, thus facilitating handling of the machine in all phases of processing.

The use of two-way radios on industrial trucks by which truck operators are given job assignments from a central dispatching station was discussed. Opinion among those who have used them is that radios increase truck efficiency tremendously. One plant manager went so far as to say that if he had only one truck, it would be radio equipped.

General tone of discussion during the sessions was that the cost of a materials handling program or of installing a handling system should not, in itself, be the deciding factor in acceptance or rejection. The total cost of producing a given product is the important item. Sometimes a proposed handling system might be twice the cost of a previous handling method but it might reduce processing costs which would be reflected in the final and overall picture.

How to arrive at the correct answer to any given materials handling problem was aptly dealt with at one session when it was suggested that solution for the toughest handling job should be assigned to the laziest man in the shop and he will come up with the best and easiest method of doing the job.

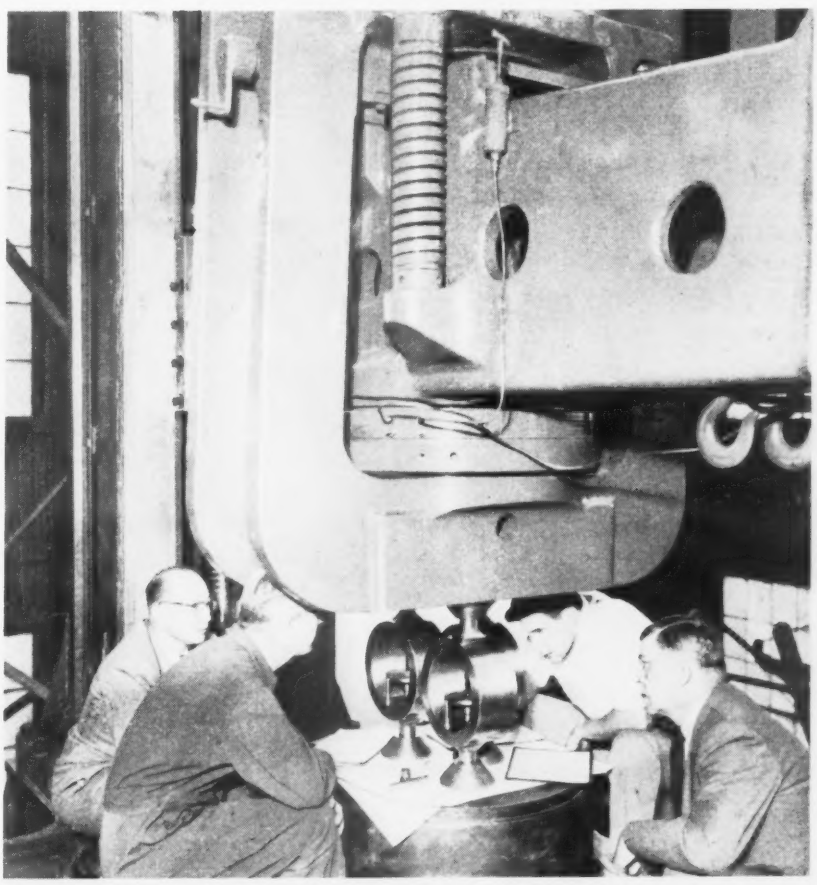
Feature of the show was the great amount of equipment so set up that it could be operated to demonstrate its advantage for its intended application. A number of companies also had operating models of their equipment so that integration of various handling operations in a typical plant installation could be observed.

Some of the newer developments exhibited were two-way radio equipment for industrial trucks, combination gas-electric trucks and gas trucks with automatic transmissions. Catalytic mufflers which remove carbon monoxide and hydrocarbon vapors from engine exhausts also were shown.

Automatic loading and unloading of conveyors and heat treating furnaces, and automatic air controlled pulsating panels for mounting inside bins or hoppers to keep granular materials flowing drew considerable attention. So did packaged conveyor and hand truck units which are shipped on an assemble-it-yourself basis.

A magnesium car loading ramp 30 ft long and 6 ft wide which can be rolled about on its two wheels for positioning by one man brought many a visitor into the company's display area. Another crowd stopper was an English-made fork-lift truck which is propelled by one man operating a bicycle-like drive mechanism. Load lifting and lowering is accomplished by battery power. Capacity of the truck for lifting and transporting is 2500 lb.

Hundreds of other new models and recent developments featured by the exhibitors provided the show with a zest much needed by the foot-sore prospective customer who tramped over six acres of concrete to be awed and enticed by the displays.



MILLION-LB HYDRAULIC TESTER: Before installation in the technical center of National Malleable & Steel Castings Co., Cleveland, this 1-million-lb universal hydraulic testing machine was erected for final tests at Baldwin-Lima-Hamilton Corp., Eddystone, Pa., where it was made. Personnel of Baldwin and A. H. Emery Co., makers of the load sensitive hydraulic cell, are watching calibration with Morehouse rings

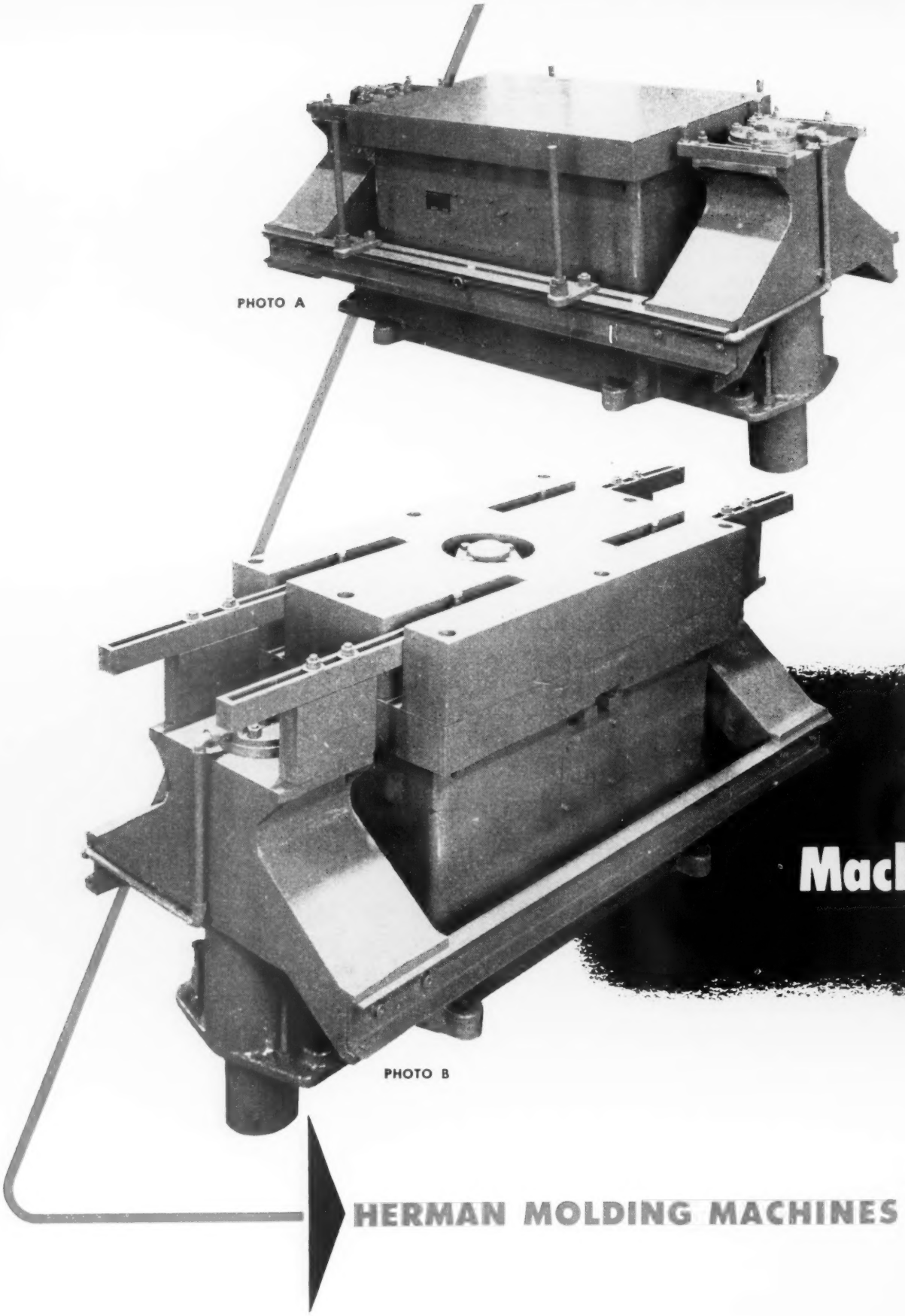


PHOTO A

PHOTO B

Thers
Machinec

HERMAN MOLDING MACHINES MAI

NO. 7 OF A SERIES

Illustrated here is our Jolt Strip or Push-Off Molding Machine which foundries have found to be extremely versatile under a wide variety of operating conditions.

Photo A shows the machine equipped with adjustable channel stripping pins, in addition to the stripping fingers on the lifting cylinders. Ideal for jobbing-type work. These pins can be moved to almost any position on the unison channels.

Photo B shows the same machine with a stool mounted on top of the table plate. Slots permit the stripping fingers on each of the lifting cylinders to move in and out to engage various lengths of flasks. This stool type Jolt Stripper is recommended for wide versatility since it will accommodate any size or shape flask within its capacity range . . . from a 2¾" stripping cylinder diameter with a 650 lb. lifting capacity to a 24" diameter with a 48,000 lb. lifting capacity.

OTHER FEATURES:

- Herman Direct Acting Vibrator insures complete separation of bond between sand and pattern during stripping operation.
- Hydraulic control by an air-on-oil principle to assure smooth operation.
- Speed regulation by hydraulic built-in control device.

Naturally, we'll be happy to furnish additional details on request.

Thersatile HERMAN Jolt Strip
imeets any known foundry demand

There is a type and size Herman Molding Machine for all foundry operations.

MEIR WAY BY THE WAY THEY'RE MADE

FOUNDRY EQUIPMENT MANUFACTURERS ASSOCIATION INC. MEMBER FEMA

Herman MOLDING MACHINES

HERMAN PNEUMATIC MACHINE CO., UNION BANK BUILDING, PITTSBURGH 22, PA.

British Steel Founders Sponsor Convention

A Customer-Foundry Convention was sponsored Apr. 15-17 at 45 Park Lane, London, by the British Steel Founders' Association of which T. H. Summerson, Summerson's Foundries Ltd., is chairman. Purpose of the convention was to demonstrate association activities in providing better products and better service to steel foundry customers. The meeting also gave customers an opportunity to express their opinions of steel casting quality and suggest possible improvements in product and service.

Titles of papers presented were: "Steel Castings and Their Application," "Customer Experience with Steel Castings," "Quality Control and Inspection as a Part of the Manufacturing Process," "Research as it Affects the Customer" and "Policy Making and Fact Finding."

An exhibition, staged concurrently with the forum, included displays of castings, theory and research activities.

Sall Metal Co. Expands

George Sall Metals Co. has completed its new, $1½ million plant at Tulip and Westmoreland Sts., Philadelphia, for the smelting and refining of nonferrous metals. Completely modern in design, the new plant ultimately will increase by almost 500 per cent the company's capacity to produce alloys of aluminum, brass, bronze, lead and zinc.

Book Review

ASTM Standards, Part 7, Textiles, Soap, Water, Paper, Adhesives, and Shipping Containers, cloth, 1334 pages, 6 x 9 in., published by the American Society for Testing Materials, 1916 Race St., Philadelphia 3. Price $10.

Containing 294 standards and tentatives pertaining to textiles, soap, water, paper, adhesives and shipping containers, this latest section of ASTM Standards is arranged in two-column format for easy reading, and printed on thin paper to reduce its bulk. The various specifications are presented under seven materials subdivisions, including textile materials, soaps and other detergents, paper and paper products, shipping containers, adhesives, water, and general testing methods. In addition to being listed under the subdivision classifications, the various standards and tentatives are listed in numeric sequence as well as in a detailed subject index.

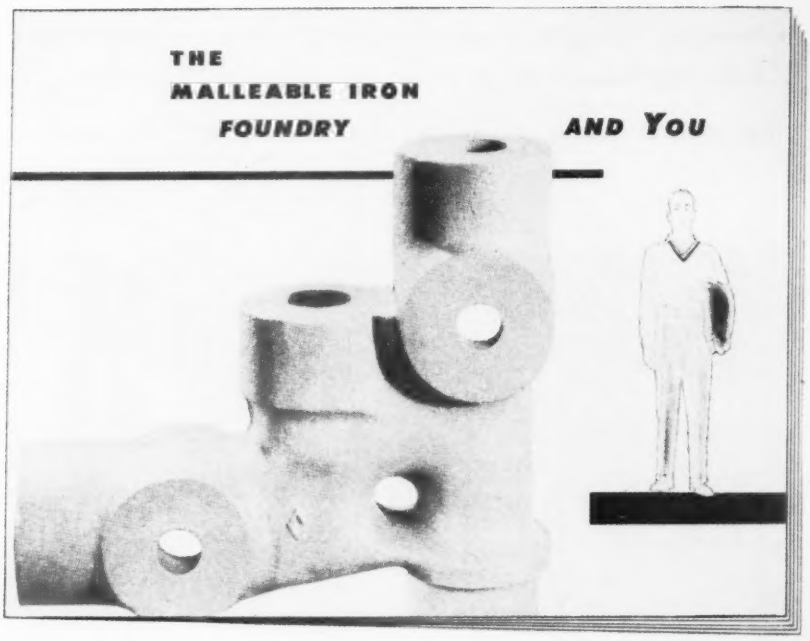
"You should see my fishing sinkers!"

Indiana Foundry Wins Two Safety Awards

Two safety awards have been presented to Plymouth Foundry Inc., Plymouth, Ind., by a Michigan liability company. L. R. Rush, superintendent, C. L. Roush, vice president, UAW-CIO Local 607, and William Schlosser, president of the foundry, received recognition for the foundry's having been first in a midwestern safety contest in 1951-52 and second in 1952-53. Only one lost-time accident has occurred in the plant for three years.

H. K. McElroy, safety engineer of the insurance company, presented the awards, two certificates of merit and a plaque.

Booklet Tells Malleable Founders' Story



DESIGNED to tell the story of malleable iron briefly and to interest young men in seeking a career in the foundry industry, a two-color booklet has been prepared and published by the education committee of the Malleable Founders' Society. It will be distributed by the society and its member companies to high school and vocational school students, to students in engineering schools at all levels and at exhibits and other special events.

Opening on the note that the foundry industry is a basic one that contributes greatly to the strength and wealth of America and therefore can offer a real future to young people, the booklet goes on to take up specific aspects of the industry.

It discusses the nature of the various types of malleable iron, outlines their respective advantages to consumers, describes some of the metal's most important applications and discusses its production and the types of work opportunities and training programs that malleable foundries offer to young men.

Following a suggestion that the reader visit the nearest malleable foundry (a list is included) to inquire about employment, the booklet closes with a section comparing the principal properties of malleable iron with those of steel, forgings, pressed parts and gray iron. Copies are available from the Malleable Founders' Society, 1800 Union Commerce Bldg., Cleveland 14.

A GOOD process made still BETTER

a BETTER Cupola Gun and a BETTER Cupoline

Do you want faster, more lasting and therefore cheaper cupola patching? You can get it in the Bondact process. The Bondact process equals the Cupoline refractory plus the Bondact gun. Both parts have been improved—the entire "package".

Thanks to our advancing methods, a new *Cupoline* now brings you a still more effective composition and greater uniformity. Results: increased flowability, minimum rebound and negligible burn-out.

Bondactor as redesigned has: (1) a new, exclusive air recovery system to reduce air consumption per pound of refractory, (2) a larger, more powerful air motor, (3) an improved rate of flow control, (4) a heavier, more positive material valve assembly, and (5) minimum maintenance.

ONLY ECP CAN PROVIDE THE COMPLETE PACKAGE
the equipment AND *the refractory*
BONDACTOR CUPOLINE

Write for OUR ATTRACTIVE PRICES ON REBUILDING YOUR PRESENT BONDACTOR TO MODEL 1250 EFFICIENCY

EASTERN CLAY PRODUCTS
DEPARTMENT
International Minerals & Chemical Corporation — 20 NORTH WACKER DRIVE, CHICAGO 6

E C P Since 1926

QUALITY, SERVICE, DEPENDABILITY, PROGRESS

MINERALS International CHEMICALS

DIXIE BOND • BLACK HILLS BENTONITE • TRIPLACT • REVIVO CORE PASTE
REVIVO BOND • BONDACTOR • CUPOLINE • DURA PRODUCTS • WESTONITE

Steel Foundry Plants "Down

(Left)—General interior view of foundry of Steel Co. of Australia
(Right)—Light casting floors in main bay; electric furnace at left

ONLY three steel foundries are in operation in New Zealand, a comparatively small country with a population under 2,000,000. One foundry is on South Island and two on North Island.

On North Island, the New Zealand Government Railways operates a steel foundry in conjunction with its work shops at Lower Hutt, Wellington. Engaged solely in the production of castings for the construction and maintenance of equipment operated by the Government Railways throughout New Zealand, this foundry is equipped with modern electric furnaces. Since it is not a trading concern, production details are not published, and it is difficult to secure any reliable information in regard to its activities.

Metal is melted in a 1½-ton Greaves-Etchells basic-lined furnace, 600 kva. Work is proceeding on the installation of a 3-ton Birlec furnace (Type P.Q.T. Electromelt), expected to be in operation this year. An acute shortage of labor has greatly restricted foundry output. Volume of finished castings has not been sufficient to satisfy railway requirements, including wheel centers, axle boxes, cylinders, side frames, bolsters and other parts. These are all plain carbon and low-alloy steel castings.

Molding operations in the steel foundry are supervised by a subforeman, under the general direction of the foreman molder, who also has charge of the nonferrous foundry and the gray iron foundry. Synthetic sand, prepared in an up-to-date sand conditioning plant, is used in the steel foundry. A few molding machines are employed, but most castings are made in hand-rammed molds on the floor and bench. Whether on machine, floor or bench work, all molders are recognized as journeyman mechanics.

In a well appointed laboratory, a metallurgist and two assistants attend to chemical and sand testing detail for the nonferrous and ferrous foundries. All melting and pouring operations are done on a night shift, 4 p.m. to 12:30 a.m. A general summary of foundry operations for 1951 shows that 23,361 total man-hours were spent in the steel foundry, 247,478 lb of good castings were produced, and 399,772 lb of metal were charged to the furnace.

A. G. Price Ltd.—The other steel foundry on North Island is operated by A. & G. Price Ltd., with head office in Aukland and main plant at Thames, a coastal town of 5000 people 75 miles southeast of Aukland. Closely associated with the early colonial history of New Zealand, Thames in the seventies had a population of 25,000, based on gold and silver mining. Principally on account of the mining background, A. & G. Price Ltd., was founded there in 1868. Although activities have widened considerably in the intervening years, expanding to Aukland and other parts of the country, the main engineering plant has been maintained in that area.

The company's steel foundry was established shortly after World War I and has been operated continuously as part of a large jobbing and manufacturing plant servicing many of the principal industries in New Zealand, including timber, milling, coal mining, quarrying and public works.

Present foundry equipment includes a 1-ton electric arc furnace operating on a short night shift during the off-peak period and a bessemer converter maintained in working order and used to supplement the other output. Shortage of electric current has prevented operation during normal hours and also has prevented expansion of the plant. About 20 per cent of production is austenitic manganese, 60 per cent mild carbon steel, and the remainder various alloy steel castings. Castings range in weight from a few pounds to a ton or more.

The combined effect of power restriction, raw material shortage and insufficient labor has limited output to approximately 3 tons per day, but the company intends to expand operations considerably when the situation improves. A second electric furnace will be installed to step up production

(Top right)—Canopy style roof over the main foundry building provides light and ventilation

(Below)—View of main bay from opposite end shown at far left

While on a South Pacific cruise last year, Thomas H. Shartle, president, Texas Electric Steel Casting Co., Houston, Tex., visited several steel foundries in Australia and New Zealand. He was surprised to learn that he was the only American steel foundryman ever to visit those plants and felt that Foundry *readers might be interested in a report on their activities*

to approximately 10 tons per day. J. Earl Brodie is managing director; R. S. O'Hagan, chief engineer; R. S. Boden, works-manager, and C. Dibley, Metallurgist.

Wilkinson Callon Ltd.—In Dunedin, on South Island, the firm of Wilkinson Callon Ltd., was established in 1896. The present company was registered in 1910 with W. A. Wilkinson as managing director. In 1949 his son W. K. Wilkinson assumed control. For many years the company produced malleable and gray iron castings from cupola-melted metal. With the installation of a Greaves-Etchell electric furnace in 1926 the company entered the steel casting field and has continued ever since to produce high and low carbon manganese and other alloy steels for general engineering, ship repair, cement and crusher plant, agricultural implement and general castings.

Molds for small repetitious castings are made on four jolt-squeeze molding machines. Molds for most of the output are hand rammed by molders on the floor, tub or bench. Castings are cleaned with shot blast machines. A new building recently completed houses shower and washrooms, locker rooms, a dining room and a well appointed laboratory and general offices.

Dawson a Pioneer—The original Dawson of Dawson's Steel & Iron Foundries Prop. Ltd., Brunswick, Victoria, Australia, is believed to have been the pioneer of the steel casting industry in Australia. Born in Clackmannan, Scotland, in 1851, John McGregor Dawson in 1852 was brought to Australia in the sailing ship *Ticonderoga*. On the long, lonely passage the plague broke out, and the majority of the crew and passengers died and were buried at sea. Survivors were quarantined at Portsea near the entrance to Port Phillips Bay, and an encampment was established on the ocean beach at Sorrento.

Young Dawson survived this and many other experiences, including foundry apprenticeship. Eventually he was appointed manager of an iron foundry owned by Phillips, McWalters and Chambers. In 1888, in partnership with Smith and Phillips, he established the Sheffield Steel Works in Brunswick. The partnership was dissolved in 1901. John M. Dawson opened a plant of his own where he was assisted by three sons. Later, three younger sons joined him in the venture. The present steel foundry occupies the site of the original plant. The founder and five of the six sons have passed away, but the business still is a family affair conducted by members of the third generation, with Roy McGregor Dawson as managing director.

The plant includes a steel foundry 75 x 184 ft, an iron foundry 86 x 184 ft, a machine shop, a pattern shop and a general office, New equipment in the recently extended foundry includes a 5-ton electric furnace, several molding machines and other equipment. The upstairs houses dining, dressing and shower rooms. Up to the present the company has confined its output to plain carbon steel

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in the range between 0.20 and 0.50 C, except in the case of brick plant knives and forcers, for which carbon content may reach 1.20 per cent.

Equipment in the iron foundry includes four electric traveling cranes and five molding machines. Castings have been made up to 8½ tons in weight. The machine shop was erected and equipped for maintenance with motorized lathes and drilling machines, a shaper, a milling machine, and oxyacetylene and electric welders. Two air compressors and a 225-hp power generating set are installed in this building. The compressors provide air for both foundries. The generating set is a standby to supply current in the even of a cutoff by the State Electricity Commission. Administrative quarters are well appointed with modern furniture and equipment.

Issues Training Booklet

A revised edition of "Your Improvement Program" has been issued by the U. S. Department of Labor's Bureau of Apprenticeship. Designed to help employers develop a skill improvement program, it contains a check list to help employers make spot evaluations of their current training systems and training needs and outlines Bureau services available to employers. Copies may be obtained from the Publications Branch, Bureau of Apprenticeship, U. S. Dept. of Labor, Washington 25.

Book Review

Grundlehrgang fur Former (Course of Fundamental Instruction for Molders), by Dellwig & Esch, 89 pages, 5½ x 8 in. Price 5.60 DM

Was jeder Maschinenformer von seiner Arbeit wissen muss (What Every Molding Machine Operator Must Know About His Job), by H. Gries, 64 pages, 5 x 8 in. Price 3120 DM

Was jeder Kermacher von seiner Arbeit wissen muss (What Every Coremaker Must Know About His Job), by C. Pfannenschmidt, 70 pages 5 x 8 in. Price 3.60 DM

Published in 1952 by Giesserei Verlag (Foundry Publications), Dusseldorf, Germany, these three small books are intended to teach apprentices and other beginners in foundries proper work methods. Every step in foundry work is explained in detail with many illustrations. The Dellwig and Esch book is a three-month course of instruction for apprentices and contains 236 illustrations. The other two volumes, also well illustrated, furnish instruction in specialized operations. Their teaching method is clear and effective.—*Prof. W. Trinks, Carnegie Institute of Technology.*

Leaded-Tin Bronzes

(*Continued from page* 97)

be left in the crucible to allow for this. The steel capsule holder is removed and the metal well mixed with an ordinary iron stirrer. (The iron stirrer is used to save wear on the holder.)

The metal is then sampled again by the small crucible and another test casting poured. If this pours quietly and shrinks on cooling instead of swelling, deoxidation is complete. If not, repeat the boride treatment until a very definite shrink occurs in the test casting. When such a casting is sectioned it will be sound. (See Fig 3).

Immediately pour the casting, which must have had ample provision for shrinkage. Temperature about 2200° F. (Always pour copper hot.) There should be no disturbance in the riser heads after the casting is poured, and the shrinkage should be very considerable, as shown in Figs. 4 and 5.

I have seen copper castings poured that were supposed to have been melted carefully, yet when the riser heads started to cool the metal swelled to such an extent that molten copper flowed over the edge of the box onto the foundry floor.

Cores Should Be Weak

Cores for copper castings must be of the very weakest type that will withstand the impact of the molten metal. If the cores do not collapse readily their resistance to crushing as the metal shrinks around them will cause the metal (which is hot short) to crack.

Cost—Calcium boride at the time of writing is $3.50 per lb; an amount equivalent to about 1 cent per lb of charge should meet the requirements.

The reason for the shape of the test block is to have a comparatively large volume of metal drawing on a small-diameter cylinder in order that the shrink factor, as seen during cooling, will be exaggerated. There is nothing gained by cutting the cold test block in two as frequently one which has swelled and spat badly shows hardly any gas holes in the cross section, indicating that the gas has escaped through the general mass of metal, or has been so finely disseminated as to be invisible to the naked eye. However, it will be found that general porosity in the castings themselves is associated with a swelled gate or swelled test block.

An interesting casting that came to the notice of the author was that of a casting base for a centrifugal pump. It measured about 10 ft in length, the ID inlet was 36 in. and the ID outlet 30 in. Shipping weight was

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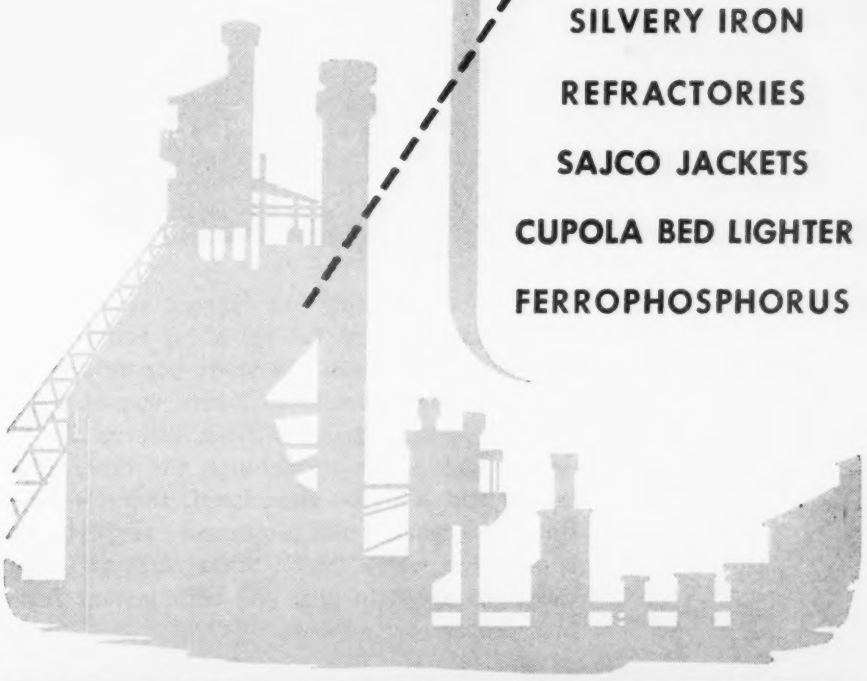

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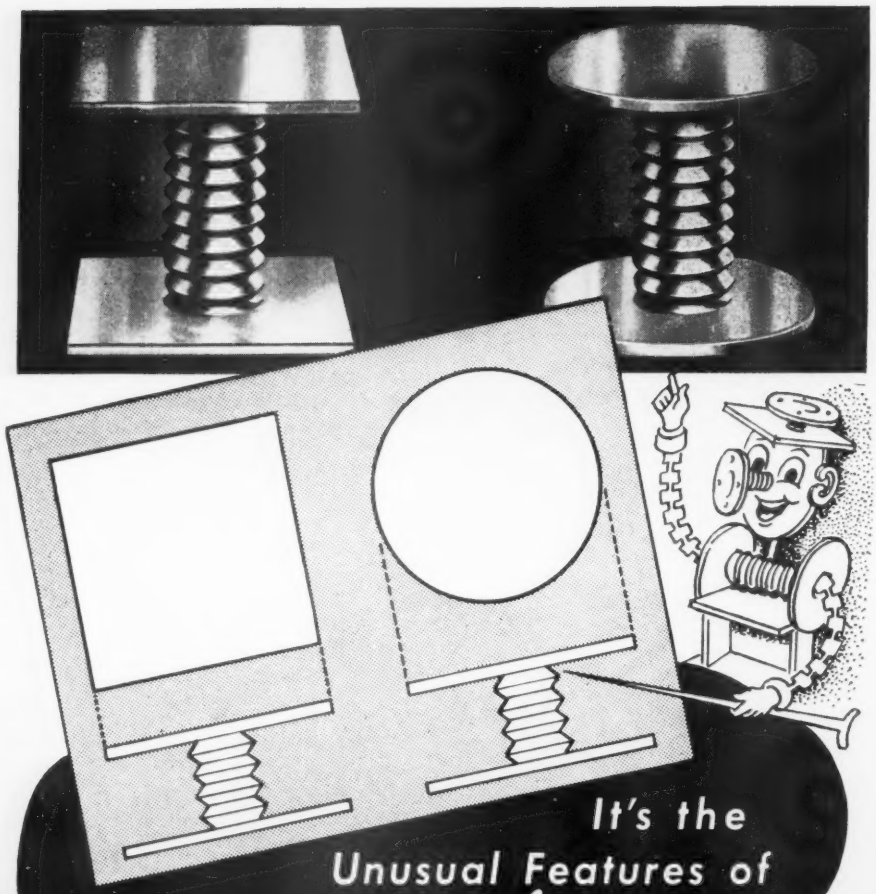

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20,000 lb. The composition was 90 per cent copper, 8 per cent tin, 2 per cent lead. Thirty thousand pounds of ingot metal was melted in an oil-fired reverberatory furnace. Melting time was four hours. No oxidizing flux such as Walpole's was used but 2 oz of 15 per cent phosphor-copper per 100 lb of metal was placed in the ladles before filling them. The tapping temperature was 2280°F and the pouring temperature 2160°F.

The reverberatory furnace temperature was controlled by Marshall couple tips placed one in each of the four walls. The relation between the wall temperatures and the metal had been established by test. The mold was made of silica sand, grain fineness 44, bonded together with 12 per cent portland cement and water to the extent of 6.5 per cent. The setting time was 72 hours, but after 24 hours, a suitable blackening called Mineralcote was applied to give a smoother skin to the casting. Provision was made for seven risers requiring, all told, 8000 lb of metal. Gypsum insulating sleeves were used with the risers and gypsum powder to cover the tops to prolong the cooling period. The casting was poured "two up" through two of the risers, two runner boxes being used. There were no stoppers in the runner boxes. The cleaning of the casting was done by 400 psi hydrostatic pressure.

Casting Cooled in Mold

Four hours after the pouring of the mold the sand was eased around the critical areas to avoid shrinkage cracking and the casting was removed at the end of 48 hours but was uncomfortably hot. Cast iron chills 2 in. thick were used to control local cooling rates; these were placed in the drag.

The cores were made of cement bonded sand in some cases and oil bonded sand in places where a softer core was indicated. The large cores had cinder filling to aid in the escape of gas and subsequent removal. Two molders and two helpers made the mold, and eight men helped in the pouring.

A test bar attached to the casting gave the following mechanical properties: Yield strength 20,000 psi; tensile strength 39,500 psi; elongation in 2 in. 32 per cent.

The casting was tested at 80 psi water pressure.

Eutectic Welding Alloys Corp., 40-40 172 St., Flushing, N. Y., has formed a Canadian company, Eutectic Welding Alloys Co. of Canada Ltd., to provide service facilities to Canadian users of its products.

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● Engineers at Arwood Precision Casting Co. use TOCCO Induction Melting Furnaces for melting and remelting quality steel. Other companies have found TOCCO equally adaptable for melting non-ferrous metals. No wonder! *Look at the advantages:*

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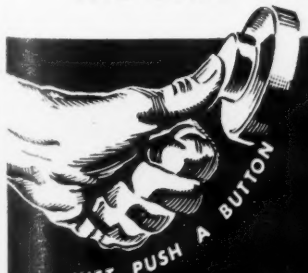

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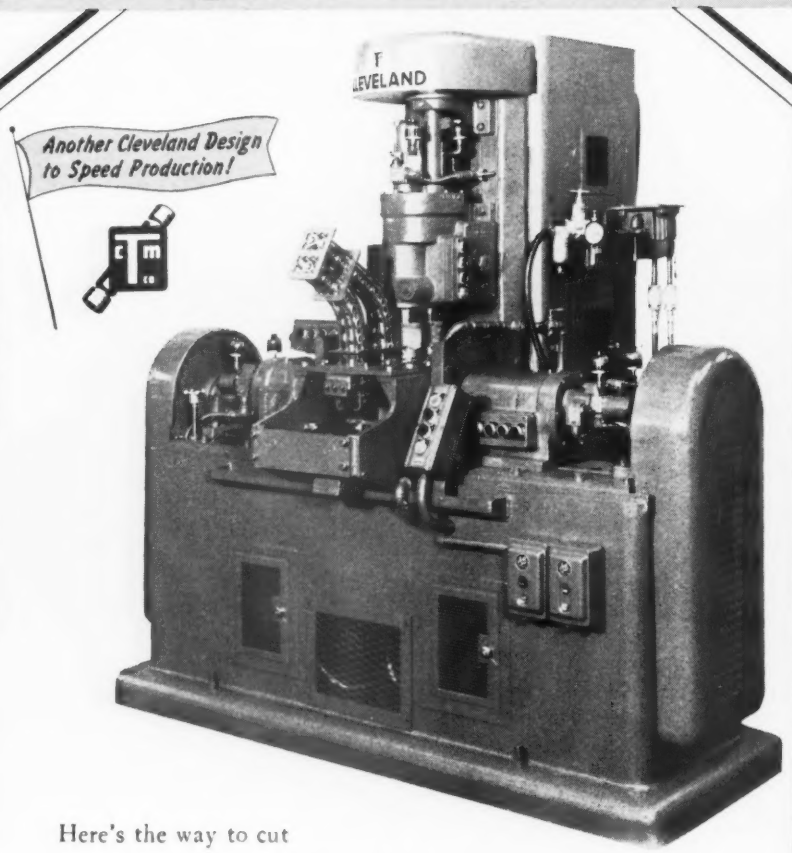

Here's the way to cut costs on tee fittings! This Model FT-1 will tap 1308 pieces ½" - 14 per hour at 100% efficiency. Also handles ¾" and 1" sizes. All spindles have their own lead screw feed—assuring the precision for which Cleveland Fitting Machines are famous. Produced parts are square and within the required tolerances. Set-up and change-over time is reduced and tap life increased up to 25%. For greater efficiency this Model may be grouped in batteries of three with one operator to each battery.

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For Better Tapping - - Faster!

CLEVELAND *lead screw* **fittings machines**

Coremaking Speeded

(*Concluded from page* 107)

coarse sands, which is the usual case with blown cores. The hot strength of the mixture may be varied to take any kind of metal. For high hot strengths it is well to add fire clay or silica flour. Bentonites tend to detract from the dry strength of the core and should be avoided where possible. When silica flour is used, a little additional moisture should be added to satisfy the fines.

The operation of the heated corebox is quite simple. First the corebox is brought up to temperature. Experience has shown that temperatures between 400-425°F give the best results. Whatever temperature is found to be best for a particular core must be retained within narrow limits during the baking process so that the corebox does not contract around the core, making it difficult to remove from the box.

The core is blown and the baking time is allowed while the corebox is still clamped. The baking time will have to be determined by trial and error for each corebox. Small cores may be removed after 10 seconds baking time while larger cores may require as much as 90 seconds. To remove the partially baked core, the corebox is pulled apart, leaving the core in one of the halves. Final removal is accomplished with compressed air applied to the common vent of the corebox half in which the core is retained. The core is then placed on a plate and allowed to air dry before use. The air dry phase is rather rapid, and most cores can be used within a few minutes after blowing.

Cores made by this method can be held to exceptionally close tolerances and are perfectly true to shape. These qualities should have more than passing interest for the foundrymen working with permanent or shell molds. With true prints, crushes and runouts can largely be avoided.

Test castings using cores made by the method described have been poured in aluminum, brass and gray iron. The cores stood up well while the castings were being poured and shook out easily in all cases.

Taco-West Corp., 525 North Noble St., Chicago, has been renamed West Instrument Corp. The change was made to include the word "instrument" since control instruments comprise most of the organization's business. No other changes were made.

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KEEP YOUR BONDING AGENT RIGHT AND YOUR MOISTURE TO A MINIMUM

Bonding agents are frequently blamed for many common casting problems . . . blows, scabs, porosity, rough finish, burn-ins, pin holes . . . when the fault generally belongs to an improper water balance in the molding sand, improper proportions in the formula, or improper moisture distribution in the mix.

A high moisture content in the mold mix, without the proper colloidal substance added for hot strength, will give a false plasticity to the mix, and the sand may cut and wash when the mold is poured.

Also, too great a percentage of the colloidal bonding agent in the mix will absorb and hold too much moisture, which will decrease the efficiency of the bond.

If old sand is being used, fines may soak up the moisture, so that proper distribution of the moisture to the bonding material is not possible.

Too much moisture content will also cause all of the evils known to the foundryman, such as blows, buckles, burn-in, drops, sand inclusions, and scabs and many of the other evils.

Good foundrymen realize that one of the best ways to insure good castings is to add the best quality bentonite bonding agent to the mold mix, in the proper proportions recommended for the green, dry and hot strength desired, and to see that the proper amount of temper water is evenly distributed throughout the mix.

4362

Adventures of Bill

By PAT DWYER

Illustration by RICHEY

ALTHOUGH it is now too late to be of any practical benefit to me personally, I was interested recently in a newspaper article on the proper and modern method of bringing up children. Citing her own experience in proof of her statements, the gifted authoress claims that the exercise of a little common sense and executive ability transforms the usual physical and nerve-wrecking job into a peaceful and delightful occupation.

Briefly, the entire secret lies in delegating certain duties to each of the children. These duties keep them so fully occupied that they have no time to fight, to tear their clothing, to stuff beans in their ears or noses, to get lost, to fall down stairs or into deep wells, to cut their fingers, stub their toes or get stung by irritable bees or wasps, to eat green apples or toadstools or to indulge in any other of the almost infinite list of activities which keeps the old-fashioned mother on the dead-run day and night.

According to the new method, household mechanics function as smoothly and silently as a $90 watch. No hurry, no rush, no overlapping, no tears, no shouting. A place for everything and everything in its place. Instead of working like a slave 19 hours per day and doing a little light sentry duty by night, the new mother can dispose of the day's work in a couple of hours. Then she is free to relax, indulge in the latest book, entertain visitors, keep up her club activities, go shopping and accompany her husband to places of amusement in the evening. She has ample time for setting-up exercises, for beauty treatments, for the application of powder, stains and unguents. Little things, you might say, but absolutely indispensable in these modern days to the woman who desires to keep the marriage bond intact.

Certain masculine old fogies may scoff at the importance attached to these seeming trifles. Eyes of these sentimental old fossils grow misty when they rest upon stubby and work-worn fingers that have gripped the oar alongside their own in storm and sunshine over a period of many years. The same mist nullifies the attraction of vermillion, pink or scarlet nails drawn out to a fine point like the talons on a bird of prey or the claws on one of the major carnivora. To one of these ancients a glint of love light in a woman's eyes is a more potent charm than a face effectually concealed behind daubs of mascara, rouge and lipstick.

However, all that is by the way. The main point at issue is that under the new and improved dispensation, the mother is not run ragged in her efforts to roll the old household chariot along. She is not overwhelmed by the multiplicity of small duties incident to controlling the fiendish activities of a number of small children.

The lady who wrote the article gives full and explicit explanation of how she has solved the problem. She modestly admits she is just a plain, ordinary person without any extraordinary or superhuman attributes. The method has lightened her work and given her many hours of freedom. She is quite confident that any person of ordinary intelligence can apply the method in her own home with equally satisfactory results.

She has four children—three girls and a boy ranging in age from nine years to three. She lists the duties allocated to each of the four and intimates that these duties may be combined in certain instances, or subdivided in other instances to meet the requirements of stable or stationary families as opposed to the more democratic type in which new members are admitted intermittently over a period of many years.

In her own case Betty Jane, aged nine, makes the beds, dusts and sweeps upstairs and helps to prepare the breakfast. At noon she runs the vacuum cleaner over the downstair rugs and in the afternoon when she returns from school she runs all the errands, sprinkles the lawn and feeds the chickens. Samantha Sue, aged seven, tidies up the bathroom in the morning, scrubs the kitchen floor and the front and back steps and washes

(*Continued on page* 236)

Illustration offers proof of how to operate Happy Home with child labor

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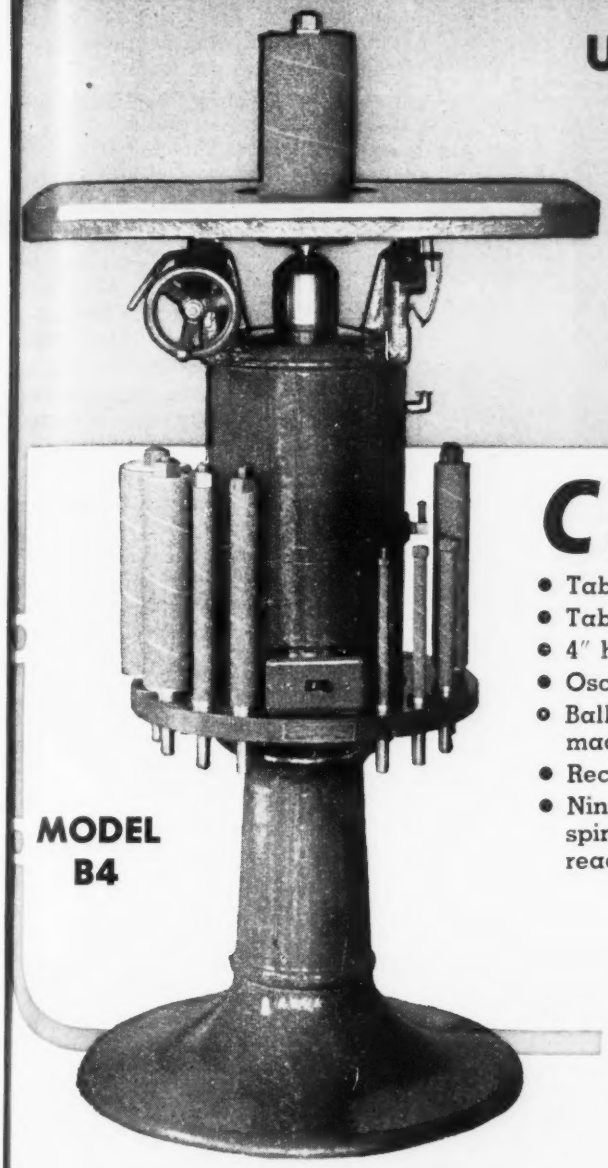

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- Table quickly returned to exact horizontal position.
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These moderately priced, precision built machines are designed and built especially for the pattern and foundry trade. Models available for both wood and metal.

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Most important is HIGH YIELD STRENGTH, for this is the measure of the *useful limit* of a material.

What do you care if a casting of such-and-such an alloy will not rupture until 40,000 psi?

What you want to know is how much the casting can take *before it fails in its job.* And that is told by its YIELD STRENGTH.

Castings made with Federated Tenzaloy will give you yield strengths up to these values:

	As Cast	Aged 10-14 Days At Room Temp.
Sand Cast	16,000 psi	25,000 psi
Permanent Mold	14,000 psi	27,000 psi

And remember, no heat treatment is needed!

These and other outstanding properties have been proved stable for as much as four years.

Full particulars are given in Bulletin No. 103. Graphs, tables, illustrations included. For free copy of bulletin use coupon below.

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(*Continued from page* 234)

the windows. She also attends to the wants, dieting and hygienic of the canary and two pet rabbits.

Ellen May, who is five, sets the table, washes the dishes, cleans the sink and carries out the garbage. She also waters the flowers in the window boxes. On Monday she collects all the soiled clothing, loads the washing machine and sets it in motion. Since she is not yet of school age she has plenty of time to do the ironing, interview peddlers and other visitors at the front and back door, and also answer the telephone. Joe, aged three, is his mother's little man. He attends the furnace, splits all the wood required for kindling and for the open grate in the living room and from the cellar carries up all the coal required for the kitchen stove.

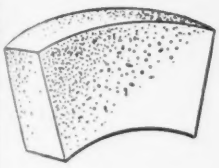
"Apparently," Bill commented after I had read him all the foregoing particulars, "little Joe is destined to become a molder in a few years. He has the traditional qualifications—a weak head and a strong back. And furthermore, my dear young fella, there is just about the same amount of truth in that last sentence as there is in the lady expert's formula for operating the Happy Home with child labor. Reminds me of a brief comment I read the other day by an honest citizen sick and tired of reading and hearing words, words, words. Give a lissen vunce: 'Two Commandments containing the law of God 25 words. The Lord's Prayer 56 words. Lincoln's Gettysburg Address 266 words. Ten Commandments 297 words. Declaration of Independence 300 words. OPS Order putting price on head of cabbage 26,911 words.' "

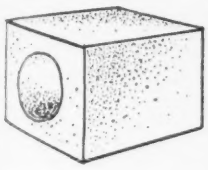
"With charity for all and malice toward none," I pointed out to Bill, "every industry develops a language of its own. In the past two decades the government has done pretty well along this line. Official Washington has gone in strongly for initials. Also has come up with some surprising words so unintelligible to the average person that the term 'gobblygook' was invented to describe them. In a different category is the jargon government employees use when discussing department activities.

"You don't refer to your office—you refer to your *shop.* You do this in *your* shop—I do this in *my* shop. You don't delay something which you think should not be done—you drag your feet. You don't postpone or slow up a program—you *phase* it out. You don't deal with this matter under a certain description—you handle it within a certain *framework.* And of course everything follows a certain

(*Continued on page* 238)

For Longer Lining Life Use . . .
WALSH Missouri-Quality REFRACTORIES for the FOUNDRY INDUSTRY





FIRE BRICK

Brand	Type	Fusion Point	Uses
WARCO XXT (Missouri High Heat Duty)	Deaired Stiff Mud	Cone 32-33 (3173° F.)	Metallurgical furnaces where slag and abrasive action is severe. Malleable furnace side walls.
BUNG BRICK (Missouri Super Duty)	Dry Press	Cone 34 (3200° F.)	Malleable furnace roofs.
MULLITEX (Missouri Super Duty	Dry Press	Cone 34 (3200° F.)	Furnaces operating at high temperatures with sudden temperature changes. Malleable furnace bottoms and roofs, non-ferrous furnace linings.
MULLITEX HB (Missouri High Burn Super Duty)	Dry Press	Cone 34 (3200° F.)	Highly resistant to slag, abrasion, shrinkage and sudden temperature changes. Electric furnace roofs ferrous and non-ferrous furnace linings.
APEX (Missouri Extra Duty)	Deaired Stiff Mud	Cone 34-35 (3200-3245° F.)	Wherever high temperatures, slag, abrasion and corrosive action prevail.

Walsh also makes: Cupola Blocks, Tap Out Brick, Slag Hole Block, Ladle Bottoms, High Temperature Ferrous and Non-Ferrous Furnace Linings.

PLASTICS

Brand	Max. Service Temp.	Fusion Point	Packaging	Type	Uses
GRAFLOK (Missouri Super Duty with Graphite Base) (Wet or Dry)	3000° F.	Cone 33-34	500 lb. drums 100 lb. cartons 100 lb. bags	Air & Heat Setting	For ram lining bull ladles, spouts, runners, patching, where molten metal covers and forms seal resulting in longer life, cleaner castings.
K-11 PLASTIC (Wet or Dry)	3200° F.	Cone 36-37	100 lb. cartons 225 lb. drums 500 lb. drums 100 lb. bags	Air & Heat Setting	Withstands electric furnace temperatures and conditions. Excellent for rammed linings, spouts, runners, burner ports, pit furnaces, patching.

CEMENTS

Brand	Max. Service Temp.	Fusion Point	Packaging	Type	Uses
GRAFLOK LADLE COATING (Dry) (Missouri Super Duty with Graphite Base)	3000° F.	Cone 33-34	100 lb. bags	Heat Setting	For brush coating over Graflok Plastic. Affords added protection and longer life.
MULLITEX CEMENT (Wet or Dry)	3150° F.	Cone 34-35	100 lb. bags 200 lb. drums 500 lb. drums	Heat & Air Setting	For laying up and surfacing fire brick subjected to severe joint erosion.
METALOK (Missouri Super Quality Mortar—Dry)	3200° F.	Cone 36	100 lb. bags	Heat Setting	Unusually resistant to slag action—highly suitable for laying up fire brick in malleable furnace sidewalls, ladles, hot metal mixers, electric furnaces, etc.

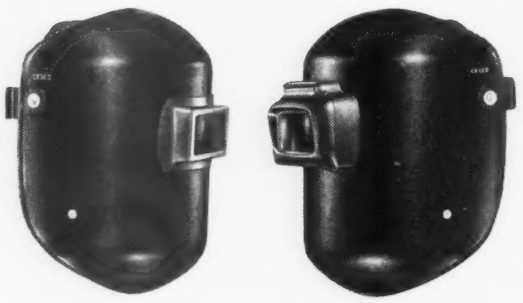
WALSH
REFRACTORIES CORPORATION
ST LOUIS MISSOURI U.S.A.

Walsh also supplies the foundry with Fire Clays, Ground Fire Clays, Milled Foundry Clays, Super Duty Plastic Furnace Linings, Castables and other Refractory Specialties.

101 FERRY STREET, ST. LOUIS 7, MISSOURI
FACTORIES: ST. LOUIS AND VANDALIA, MISSOURI

CESCO RIGHT... before your Eyes!

NEW!



No. 401-7F with STATIONARY LENS HOLDER

No. 401-2F with LIFT-FRONT LENS HOLDER

FIBER GLASS WELDING HELMETS

• Here's a brand new fiber glass welding helmet by CESCO that is not affected by heat or moisture . . . and it won't warp or buckle. Thousands of tiny glass fibers are moulded under great pressure into a strong, tough one-piece shell which has satisfactory high heat insulating qualities.

• Exterior finish is smooth and easy to clean. Interior is dull-coated to reduce reflections. Standard 2" x 4¼" lenses.

• CESCO Fiber Glass Welding Helmets are designed for safety and comfort. They are light in weight and have form-fitting headgear with easily adjusted leather sweatband. They're—"*Right . . . before your Eyes.*"

Send TODAY

for CESCO literature and the name of your CESCO safety equipment distributor

CHICAGO EYE SHIELD COMPANY • 2324 Warren Blvd. • Chicago 12, Ill.

CESCO FOR SAFETY

OFFICES IN: Atlanta, Birmingham, Boston, Buffalo, Cincinnati, Cleveland, Columbus, Detroit, East Orange, Houston, Kansas City, Knoxville, Little Rock, Los Angeles, Mexico City, D. F., Milwaukee, Montreal, Philadelphia, Pittsburgh, Salt Lake City, San Francisco, Spokane, St. Louis, St. Paul, Toledo, Tulsa

(*Continued from page* 236)

directive. You don't refer to a mistake in timing or a discrepancy between the objective and the accomplishment—you talk about *slippage* or a short fall. You don't say there isn't enough to go around—you say it is in *short supply.* You don't appoint a group to look into a certain problem—you employ a *task force.* You don't refer to the matter at hand as a specific problem—you refer to the assignment as an *ad hoc detail.* You don't conclude or end a job—you *finalize* it."

"Well," Bill said, "I'll tell you. I would not like to carry on correspondence with these here now gobblygook birds who invent and spin out their wonderful product. Fortunately the letters I receive usually are plain, blunt and to the point with no attempt at verbal ornamentation. For example, recently I had one from a man who said he was contemplating the production of a machine tool base weighing about 1800 lb. He was of the opinion that the casting should be made in a skin-dried mold. Since his experience in this line had been limited he would appreciate information on materials and methods.

"Machine tool bases of much greater weight than 1800 lb are produced quite satisfactorily in green-sand molds if the sand is of a suitable character and the molders are accustomed to the work. However, skin drying the mold imparts a perfectly clean, smooth surface to the casting and eliminates many of the potential hazards—cuts, scabs, erosion and the generation of steam which may produce blowholes, sponginess and dirty areas on surfaces to be machined. Skin drying the mold face is a modified form of baking and produces a hard, dry surface against which the molten iron lies quietly. Also a thicker coating of blacking than is usual in green sand molding may be applied to the sand face since the moisture is all evaporated by the application of heat before the mold is closed.

"Furthermore, a coarser grade of sand may be employed for facing since the heavy coat of blacking supplies the necessary smooth surface. Coarse sand has greater permeability than fine sand. Therefore, any steam or gas passes through it and away from the casting more readily.

"Facing sand for a skin-dried mold may be prepared by the addition of a comparatively small quantity of any dry or water soluble core binder. The object merely is to add a material which will bind the sand grains together when the natural or clay bond loses its *grip* under the application of

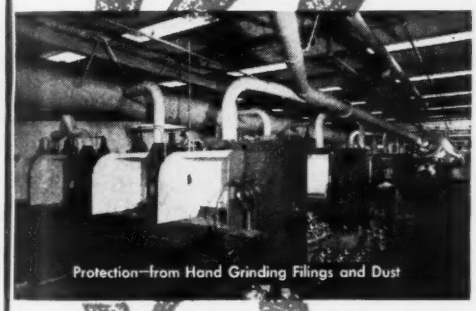
(*Continued on page* 240)

Like A "Friendly" Octopus

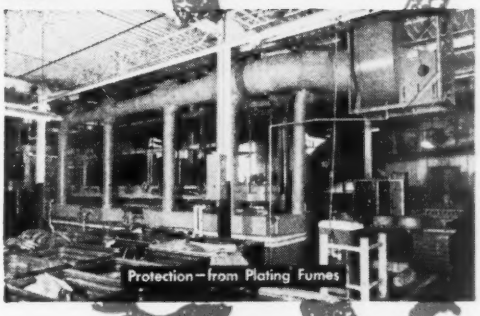
Hydro-Whirl
WET TYPE

DUST COLLECTING SYSTEMS

Protection — From Machine Grinding Chips and Dust



Protection—from Hand Grinding Filings and Dust



Protection—from Plating Fumes

Draw Impurities From The Air

Long in operation are these efficient Hydro-Whirl Central Systems. They were laid out by Peters-Dalton for a large plant where numerous and serious problems for dust and fume collection existed. PD Engineers specified and designed the systems illustrated . . . a PD **"extra"** that is worth your inquiry. They have given efficient and economical service for years. Besides the protection they afford, these wet type Dust Collecting Systems completely eliminated individual cabinet-type dust collectors, **effecting great savings in capital investment.**

Hydro-Whirl Wet Dust Collectors simplify all known methods by dispensing with spray nozzles, screens, and all other parts subject to clogging. Their application in buffing, grinding and trimming operations, molding and foundry work, and many other industrial operations, has proved exceptionally effective and serviceable. In addition to the Central Systems illustrated, Hydro-Whirl Dust Collectors can also be furnished for many small, individual applications.

Write for Catalog

Hydro-Whirl Paint Spray Booths *Industrial Washing Equipment*

Drying and Baking Ovens *Hydro-Whirl Dust Collecting Systems*

Peters-Dalton INC.

17906 Ryan Road • Detroit 12, Michigan

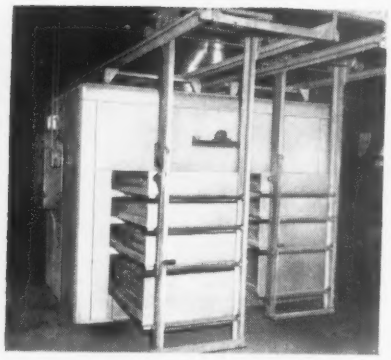
FOUNDRY OVENS

with MAXIMUM AIR RECIRCULATION

H-O-R-I-Z-O-N-T-A-L-L-Y

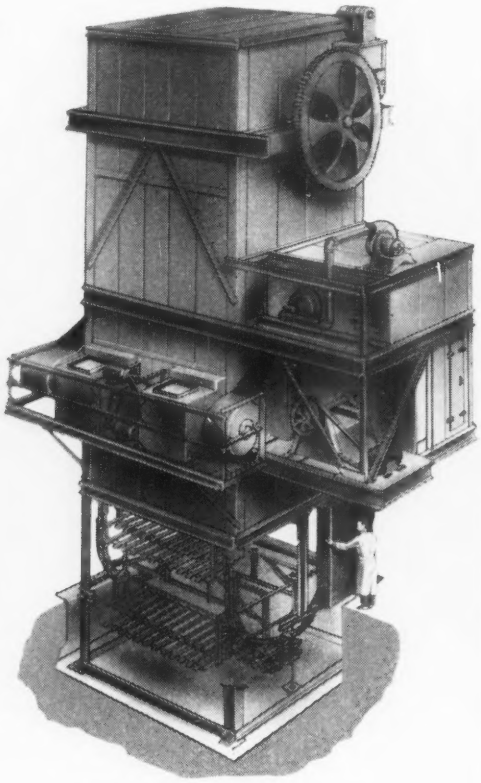
Another
ENGINEERING ACHIEVEMENT
By

MICHIGAN OVEN COMPANY
DETROIT MICHIGAN
MOCO



ROLLER DRAWER OVEN

CAR OR RACK OVEN



CONVEYOR CORE OVEN

WRITE FOR NEW FOLDER

it shows and describes MOCO's complete line of Foundry Ovens—and how they can *step-up efficiency* and *cut costs* for YOU.

Maximum volume of recirculated air provides a new high in *temperature uniformity* — *faster baking—elimination of hot spots.* Heaters and fans are self-contained within the oven structure — eliminating heat losses and field insulation—and saving floor space.

Capacity is more than ample for heat, recirculation, and exhaust. Accessory equipment is of highest quality.

MICHIGAN OVEN COMPANY

419 BRAINARD, DETROIT 1, MICHIGAN

(*Continued from page* 238)

heat. For example, flour in the proportion of 1 part flour to 12 parts sand will serve. Any of the proprietary binders will serve in an equally satisfactory manner. The proportions will vary to some extent, depending principally on the character of the sand. The pattern is covered with the prepared facing sand and the mold is made in the usual manner.

"Any one of several alternative methods may be employed in coating the face of the mold with blacking. In this instance the term 'blacking' is used in the generic or foundry sense and includes any material with a carbon base. For exceptionally heavy castings silica flour is used as in steel foundry practice. Plumbago, also known as silver lead, usually is employed on skin dried molds for iron castings. The principal reason probably is because plumbago may be applied either in a dry state or as a wash in which the material is mixed with water containing a little molasses or other water soluble binder—about 1 pt to a pailful of water. Where only a slight skin drying effect is required—⅛ to ¼ in.—the plumbago is applied with a brush or rubbed on by hand. The molder then goes over the entire surface with a brush dipped in a weak solution of molasses water or other binder.

"If a deeper penetration is required, the blacking or plumbago is applied in liquid form either with a brush, swab, or from the nozzle of a spray gun. This is a job for a skilled operator. In the hands of an unskilled or careless man an excessive amount of the material will be deposited in corners, pockets, flanges, etc., in the bottom of the mold. Not only will this excess material destroy the shape of the mold at these points, but it will resist almost every effort to dry it out. Under certain conditions the molder finds it advisable to cover certain areas in the bottom of the mold with paper or waste until after he has applied the wash to the vertical walls and other mold surfaces. The covering then is removed with the accumulated droppings and the molder applies the necessary amount of blacking to the exposed areas.

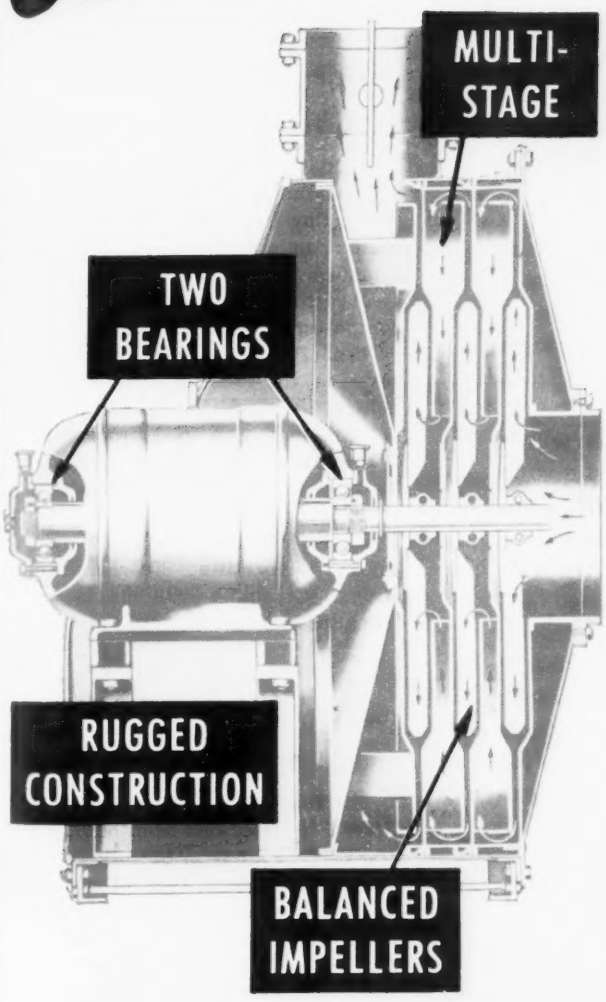
"Local conditions govern the methods and fuel employed for drying the mold. When gas or oil burners are available, they may be adapted readily to serve the purpose and probably constitute the cleanest and most convenient method. Torches operating on compressed air and oil are employed extensively in skin drying practice. In the hands of a skilled oper-

(*Concluded on page* 242)

CONTINUOUS PRODUCTION

Assured 4 Ways

WITH SPENCER TURBO-COMPRESSORS



There are good reasons why the annual installation of Spencer Turbos has increased tenfold in ten years and why a recent analysis shows that repair parts amount to less than one dollar per machine per year.

No. 1. The Spencer multi-stage construction allows a smaller diameter machine with lower peripheral speeds of the fan blades and of the motor itself. The wear on the bearings is therefore cut to a minimum.

No. 2. The only rotating contacts are at the two ball bearings, which if kept greased will assure satisfactory operation without work stoppages for many years.

No. 3. Here is a machine as simple as an electric fan, with a rugged construction, as sturdy as a steel bridge and with wide clearances between the rotating elements and stationary parts. Users say "the Spencer goes on forever with little attention."

No. 4. Balanced Impellers. Each fan is individually balanced before the machine is assembled. This decreases the vibration, increases the life of the bear ings and packing and produces quiet performance.

35 TO 20,000 C.F.M.; 4 OZ. TO 10 LBS.; 1/3 TO 1,000 H.P.

440-H

THE SPENCER TURBINE COMPANY • HARTFORD 6, CONNECTICUT

SPENCER
HARTFORD

HERE IS A ROSE *without thorns...!*

Ordinary chilled iron abrasives have two disadvantages that cost you a lot of money; 1., being hard, they're brittle, resulting in a rapid breakdown and high abrasive consumption per pound or piece of work processed; and 2., the high hardness produces high maintenance costs. Would you be interested in a rose *WITHOUT* these thorns?

Controlled "T" shot and grit are chilled iron abrasives in which the iron carbides (that do the cutting) are imbedded in a ductile matrix—this shot actually deforms before tearing apart. Controlled "T" shot and grit are held to a hardness range below 450 BHN—the wearing parts of your cleaning equipment usually have a hardness range of from 450 to 550 BHN. Controlled "T" cuts as fast (or faster), lasts longer and is easier on your equipment.

Controlled "T" shot and grit may sell for as much as $10 to $20 more per ton, yet we make you this straightforward guarantee: Your cleaning costs (or abrasive costs alone, if you prefer) will be 15% less, regardless of the price you may be paying now for your chilled iron abrasives. Fair enough? The worst that can happen to you on such a test is a 15% saving. Write, wire or phone the nearest Hickman, Williams office.

H W

REG. U.S. PAT. OFF.

P.S. A complimentary copy of "A Primer on the use of Shot and Grit" is yours for the asking.

NATIONAL CONTROLLED "T" SHOT AND GRIT IS PRODUCED EXCLUSIVELY BY

THE NATIONAL METAL ABRASIVE CO., CLEVELAND, OHIO

WESTERN METAL ABRASIVES CO., CHICAGO HEIGHTS, ILL.

AND SOLD EXCLUSIVELY BY

HICKMAN, WILLIAMS & COMPANY

(INCORPORATED)

CHICAGO • DETROIT • CINCINNATI • ST. LOUIS • NEW YORK • CLEVELAND

PHILADELPHIA • PITTSBURGH • INDIANAPOLIS

(*Concluded from page* 240)

ator they are ideal for the purpose. Charcoal fires have been used in the foundry for many years. In some instances the fires are built on thin steel sheets either submerged in the mold or supported on the joint. Coke baskets are employed in a similar manner.

"In an emergency a cope has been dried over a wood fire. If the coke or charcoal fire is built inside the mold, the top of the mold is covered with thin plates to conserve the heat. In some instances it is feasible to lower the cope to a position a few inches above the drag and thus dry cope and drag with the same fire. When large molds are dried in the floor, the cope is closed over the drag and a stream of hot air driven by a fan through a coke fire is forced down through the runner or riser."

Heat Flow Laboratory at Columbia Described

Booklet containing information about Columbia University's heat and mass flow analyzer laboratory has been published by the university. Founded 12 years ago as a nonprofit service to industry, the facility is a computing laboratory for the study of heat flow and diffusion problems, covering the field of industrial technology from steel, ceramic and rubber production to food processing.

Interested persons can obtain the booklet by addressing a request on company stationery to Dr. Victor Paschkis, Heat and Mass Flow Analyzer Laboratory, 624 Engineering Bldg., Columbia University, New York 27.

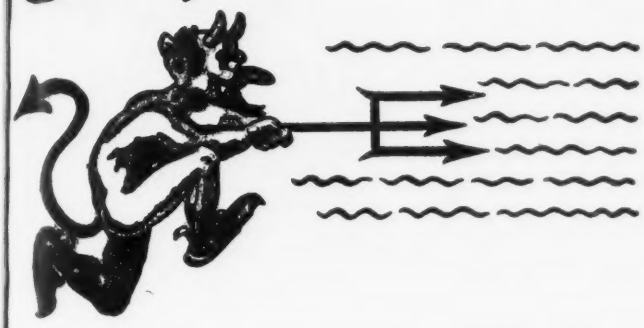
Steel Founders' Society Issues 1953 Directory

The 1953 edition of the *Directory of Steel Foundries* has been published by the Steel Founders' Society of America. It contains the latest obtainable information concerning steel foundry personnel, production facilities and other points. Producers of heat and corrosion steel, high manganese, investment mold and tool steel castings are included.

Consecutive sections are devoted to U. S. A. steel foundries, to U. S. government agencies' steel foundry listings, to all known Canadian steel foundries, to all known Mexican steel foundries and to an index of U. S. steel foundries by states.

Copies may be ordered at $10 each from the society, 920 Midland Bldg., Cleveland 15.

Soffel's



FLUXES and EXOTHERMIC COMPOUNDS

for all

Metals and Alloys

THERMOTOMIC "X" COMPOUND is an exothermic material which is molded and baked into necked down riser cores and inserts. It produces a temperature of 3500° F. and is used as ring inserts under the risers or feeding heads. Great savings are realized through reduced riser dimensions and cleaning costs. For use on top of the metal in the heads we recommend Carbon Free Liquidizer No. 5.

THERMOTOMIC ABC—For aluminum and magnesium castings, necked down riser cores and inserts—prevents piping and shrinkage into castings. Soffel's ALX-31 Liquidizer should be used on top of the metals in the head.

THERMOTOMIC HoTop LIQUIDIZER — For short risers—save 60 to 70% of feeding metal in the heads.
SOFFEL'S EXOTHERMIC CARBON FREE LIQUIDIZER—Feeding head compound for castings and ingots of ferrous and non-ferrous metals—saves metal and prevents piping and shrinkage.
CARBON FREE LIQUIDIZER AL-X31—For aluminum and magnesium feeding heads—prevents piping.
EXOTHERMIC INSULATING SLEEVE CORE COMPOUND—For riser sleeves—adds heat and prolongs fluidity of feeding metal in heads or risers.
DENSILTITE LADLE FLUX—For iron and semi-steel —reduces sulfur and phosphorous. Adds fluidity and temperature in pouring ladles—produces clean iron.

SOFFEL'S NON-FERROUS FLUXES

SB-2—For red brass, nickel and tin bronze pressure castings—removes sulfur, iron, phosphorous oxides and gas from brass and bronze.

SUPER BRASS FLUX—For brass and bronze—Prevents oxidation of zinc.

BRASS REFINING FLUX—For cupola melting and open flame furnaces—prevents oxidation. Produces liquid slag and faster melting.

COVERALL BRASS FLUX—Removes gas and oxides from yellow brass and nickel silver.

RADIOCLARITE BRASS FLUX—For open flame furnace melting—increases fluidity, tensile strength, removes gas, oxides and iron.

AB-6 BRASS FLUX—For electric furnace melting of brass and aluminum bronze—keeps furnace linings clean.

KLEEN-ALL BRASS CLEANER—Absorbs liquid slag and oxides from the metal—keeps ladles and furnace linings clean.

BRASS ALUMINUM REMOVER—Removes all traces of aluminum from copper, brass or bronze.

HI-LED BRONZE FLUX—Holds lead up to 50% in copper without use of nickel.

NICKEL MONEL FLUX—Removes gas and adds fluidity to metal.

ALUMINUM BRONZE FLUX — A perfect deoxidizer for reducing aluminum and iron oxide in manganese bronze and aluminum bronze. Adds fluidity.

COPPERTITE FLUX—For high conductivity castings —removes cuprous and cupric oxides and gas from copper.

FERRO-OUT IRON REMOVER—Removes free iron or alloyed iron from brass, bronze or copper.

SOFFELITE ALUMINUM FLUX—Removes aluminum oxide and iron from aluminum and increases the fluidity and tensile strength.

MAGNALUM FLUX—For magnesium and aluminum alloys — removes gas and oxide and increases fluidity.

KLEN ZINC FLUX — A deoxidizer and purifier for zinc base pressure die castings—removes gas, sulfur and iron.

DIE COATING—For pressure zinc base die castings —will not scale, blister or create gas in the molds.

PERMANENT MOLD COATING—For aluminum and magnesium castings — adds longer life to molds. Produces clean gas free castings.

POT COATING—For iron pot melting — increases life of pots. Prevents iron pick up.

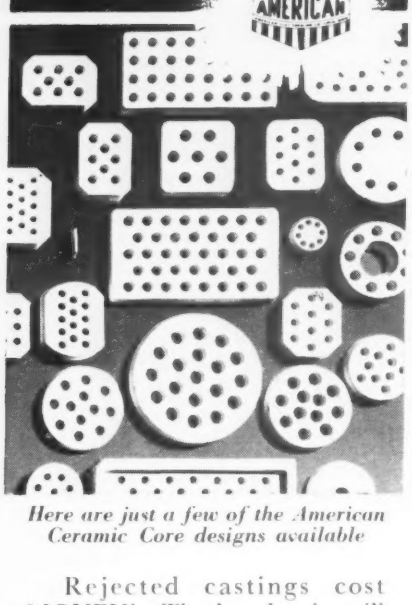
U. S. Patents No. 2,490,327 and No. 2,500,097

PITTSBURGH METALS PURIFYING COMPANY

World's Largest Manufacturers of Fluxes and Purifiers For All Metals and Alloys

1352 MARVISTA ST., N. S. PITTSBURGH 12, PA.

Fewer Rejects with AMERICAN CERAMIC STRAINER CORES



Here are just a few of the American Ceramic Core designs available

Rejected castings cost MONEY! That's why it will PAY you to investigate American Ceramic Strainer Cores for your foundry.

Made of high quality materials to withstand the shock of molten metal — American Cores remain round and uniform during the pouring operation — this assures you of a slag-free casting every time.

American will quote prices on any size or shape Strainer Core. Write today for samples and descriptive literature. There's no obligation, of course.

AMERICAN

THE AMERICAN CLAY FORMING CO.
Tiffin, Ohio — Tyler, Texas
National Sales Representative
WILLISTON & COMPANY
DELTA, OHIO
Manufacturers of Specialized Refractories for over 30 Years.

Reduce Freight Rates on Foundry Sand

Freight rates on sand shipped interstate in closed cars were cut 37 to 50 cents a ton as of May 2, 1953. This reduction is the result of a complaint filed several years ago with the Interstate Commerce Commission by the National Industrial Sand Association. The shippers attacked the accumulation of increases on sand shipment in closed cars that started in 1946 with a revenue case known as Ex Parte 162 and is still going on, Ex Parte 175 being the most recent case. The result of these cases was that greater increases were imposed on sand in closed cars than on sand in open cars.

The ICC has agreed with complainants and has ordered the railroads to publish rates on sand in closed cars for distances over 300 miles that do not exceed those on sand in open cars. For distances under 300 miles, a sliding scale is imposed which allows closed car rates to be somewhat higher than open car rates, but not nearly so much as they had been.

The National Industrial Sand Association is headed by Cortner M. Hardy, Hardy Sand Co., Evansville, Ind. E. M. Durstine, Keener Sand & Clay Co., Columbus, O., is chairman of the traffic committee, which initiated the proceedings. V. P. Ahearn is the association's executive secretary, and offices are in Washington.

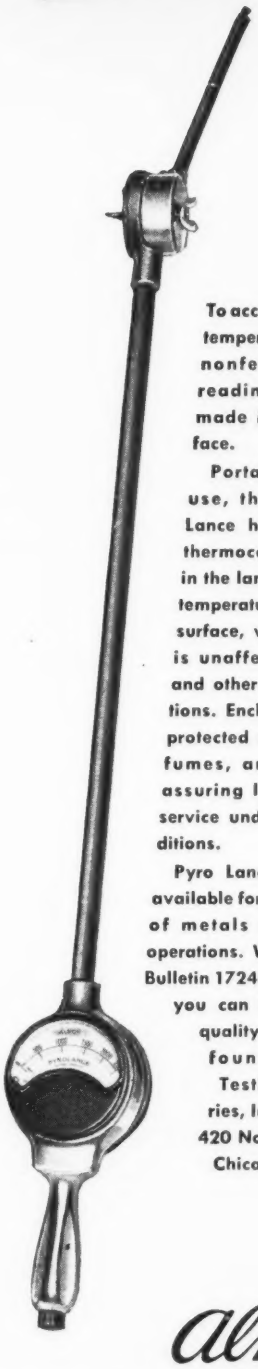
MIT Will Hold Course in Casting of Light Metals

Recognizing the growing importance of light metal castings, Massachusetts Institute of Technology will hold a special summer program in the casting of light metals from Aug. 31 to Sept. 4. The program covers aluminum, magnesium and titanium; one day will be devoted to titanium.

Howard F. Taylor, professor of metallurgy, will direct the program, assisted by Clyde M. Adams, assistant professor of metallurgy; Michael B. Bever, associate professor of metallurgy; Carle R. Hayward, professor of process metallurgy, emeritus; Charles C. Reynold, Division of Industrial Co-operation; Robert S. Williams, professor of physical metallurgy, emeritus; and John Wulff, professor of metallurgy.

According to Professor Taylor, the program will be designed to bring industrial and academic personnel together for mutual discussion of problems, to acquaint industry with the latest technological developments in the manufacture and use of light met-

in nonferrous foundries SURFACE INDICATIONS CAN BE MISLEADING



To accurately measure temperature of molten nonferrous metals, readings should be made *below* the surface.

Portable, handy to use, the Alnor Pyro Lance has a protected thermocouple mounted in the lance tip—it takes temperatures below the surface, where accuracy is unaffected by dross and other surface conditions. Enclosed couple is protected against flame, fumes, and corrosion, assuring long, accurate service under severe conditions.

Pyro Lance models are available for a wide variety of metals and foundry operations. Write today for Bulletin 1724-D and see how you can have low-cost quality control in your foundry. Illinois Testing Laboratories, Inc., Room 511, 420 North LaSalle St., Chicago 10, Illinois.

Alnor

PRECISION INSTRUMENTS FOR EVERY INDUSTRY

l castings and to clarify for those n academic life the problem facing oundrymen and users of castings.

Further information and application blanks for the program may be obtained from the director of the Summer Session, Room 3-107, Massachusetts Institute of Technology, Cambridge 39, Mass.

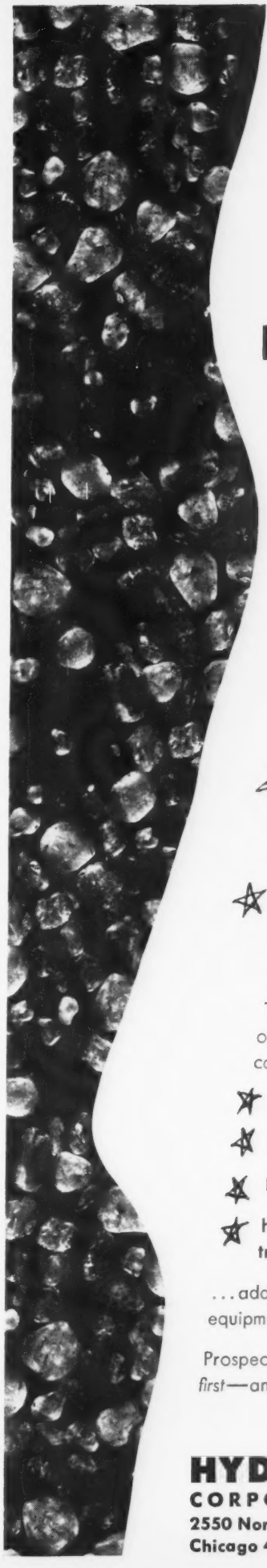
Aluminum Association Elects Officers

D. A. Rhoades, Kaiser Aluminum & Chemical Corp., Oakland, Calif. was elected president of the Aluminum Association at the organizations' annual business meeting, in New York. Three vice presidents and three directors-at-large also were elected. A. V. Davis, Aluminum Co. of America, New York, was re-elected chairman of the board, and Donald M. White was reappointed secretary and treasurer.

In the Foundry Division, L. E. DeGroat, Permold Co., Medina, O., was re-elected chairman, and R. G. Tessendorf, Aluminum Industries Inc., Cincinnati, vice chairman. R. J. Roshirt, Bohn Aluminum & Brass Corp., Detroit, was designated to represent the division on the board of directors, and D. M. White was named treasurer.

Two companies were elected to association membership during the meeting, bringing the total number of members to 47. The new members are Ebaloy Foundries Co., Rockford, Ill., and Nichols Wire & Aluminum Co., Davenport, Iowa. Robert C. Lombard, vice president of Ebaloy, will serve as official association representative for his firm.

"I'll have to come home to eat, dear. I found a little mold on my lunch!"



Do you realize that . . .

- nearly 90% of all sand reclaimed in U. S. iron and steel foundries is reclaimed by Hydro-Blast equipment
- about 5000 tons per day of used sand is reclaimed by Hydro-Blast
- sand reclaimed by Hydro-Blast is equal, often superior, to new sand—produces better quality castings; *many foundries prefer sand reclaimed by Hydro-Blast*
- more than 200 foundries have sent refuse sand for big-scale Hydro-Blast pilot-plant tests—and 90% *of that sand was returned for production use*
- only Hydro-Blast has studied sand chemistry and sand reclamation continuously since 1935, and offers you a wealth of unique engineering experience

There's no field of potential savings so rich as this one of reclaiming refuse sand; and tremendous cash benefits from

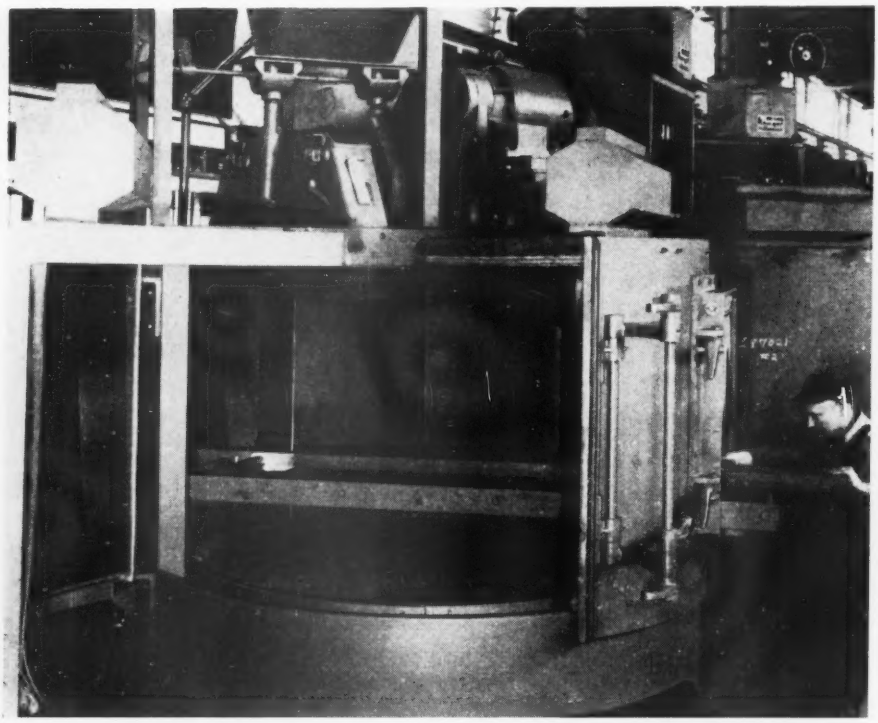
- better quality of castings
- increased production
- lower rejection rate
- huge cuts in costs of sand and sand transportation

. . . add up to speedy amortization of Hydro-Blast equipment: *usually within two years or less!*

Prospecting for a "sure thing?" . . . talk to Hydro-Blast *first*—and *last.*

HYDRO-BLAST
CORPORATION
2550 North Western Avenue
Chicago 47, Illinois

New EQUIPMENT a



Airless Blast Cleaner: Pangborn Corp., 1400 Pangborn Blvd., Hagerstown, Md.—Addition of an access door to the company's LK model cleaning table is said to make the machine much more flexible in that long sections can be blast cleaned on a table of small diameter. This feature is desirable when the usual run of work in the cleaning room is of a certain size range, but an occasional larger piece also requires cleaning. Flexible rubber curtains over the access opening prevent the abrasive grit from flying into the room.

For More Details Circle No. 1—Page 249

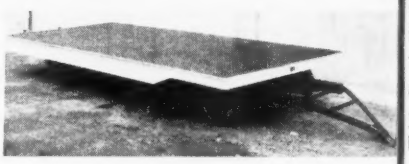
Rare Earths: Metallurgical Enterprises, Buffalo 7 — Mixed rare earth salt refined from monazite sands has a 68.7 per cent metallic equivalent and contains rare earths in the same approximate proportion as mischmetal: Cerium, 48 per cent; lanthanum, 25 per cent; neodymium, 19 per cent; praseodymium, 6 per cent. This salt is being used both as a "nodulizer" in the production of nodular iron and as a neutralizer to neutralize titanium, lead, antimony, bismuth, tin, aluminum and arsenic. Granular form of the salt promotes effective distribution of its constituents. The salt also acts as a flux of refractory oxides, according to the manufacturer. The same company markets a mix of this salt and of other elements, including silicon, which produce nodulation.

For More Details Circle No. 2—Page 249

Fork Lift Truck: Baker-Raulang Co., Baker Industrial Truck Division, 1230 West 80th St., Cleveland 2—Fork lift truck with transmission system that needs no clutch or gear shift is said to provide fuel economy, smoothness of acceleration, ease of maintenance, safety and operator convenience. It uses a gasoline engine, a specially designed variable voltage generator and an electric motor as its power system. Variable voltage generator is an integral assembly with the engine connected to the drive shaft. As engine rpm increases voltage output of the generator builds up, following a smooth, unbroken curve pattern. Travel speed is controlled entirely by foot pressure on the accelerator. Forward and reverse foot buttons control travel direction, leaving the operator's hands free for steering, lifting and tilting. The truck weighs 7500 lb and is available now in a model with 4000-lb capacity. Specifications include 123-in. over-all length, 39-in. over-all width, 78-in. turning radius, 83/130-in. standard lift, 83-in. over-all height, 8 mph maximum speed and 69-in. minimum intersecting aisle.

For More Details Circle No. 3—Page 249

Cargo Handling Trailer: Mercury Mfg. Co., 4044 South Halsted St., Chicago 9—Heavy-duty cargo handling trailer of 60,000-lb capacity is designed to facilitate handling of extra heavy material and equipment in cargo warehouses and shipping docks. Constructed with a flat bed it is 7 x 17 ft and weighs 5700 lb. Nine longitudinal and six crossbeams welded to front, rear and side channels support a ¼-in. steel deck. Channel beams 8 in. wide and longitudinal and crossbeams 4 in. wide are used in the assembly. Other features include roller bearing wheels with solid, pressed-on tires and a loop handle at the front and a hitch at the rear that allow use of the trailer as a single freight carrying unit or as part of a trackless train system.

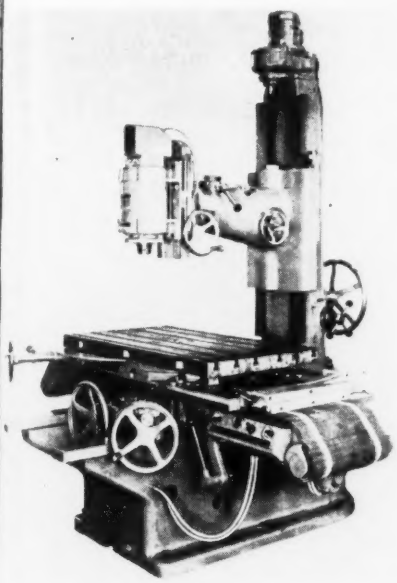


For More Details Circle No. 4—Page 249

Milling Machine: Kurt Orban Co., 205 East 42nd St., New York 17—Patternmakers' milling machine with large worktable and deep throat machines many sizes and shapes of ferrous, nonferrous and wood workpieces. Manual controls on worktable provide for 28-in. transverse and 48-in. longitudinal movement. With automatic feed, longitudinal movement is infinitely variable from

UPPLIES

For More Details on these Items Use Reply Card—Page 249



3 to 58 in. Transverse and rotary movement also are provided for by automatic feed. Maximum diameter of turntable work is 8 ft, 6 in., and depth of throat between column slide and spindle center is 35 in. Power-driven turntable allows greater working height than conventional portable turntables. A wide range of settings, adjustments and spindle speeds is provided. Variable speed changer can be operated without stopping the machine. In addition to normal operation as a milling machine, unit also can be used as a radial drill. Turning swivel column 180 degrees permits drilling of mounted castings.

For More Details Circle No. 5—Page 249

Foundry Sand: Nugent Sand Co., Muskegon, Mich.—Company is producing two new dried and graded sands to give a wider selection and closer control of grain distribution. One is a blended coarse sand of AFS 43 grain fineness, the other a blended fine sand of AFS 52 grain fineness. Other sands available include graded coarse AFS 39 fineness, regular AFS fineness 48 and graded fine AFS fineness 55 sands.

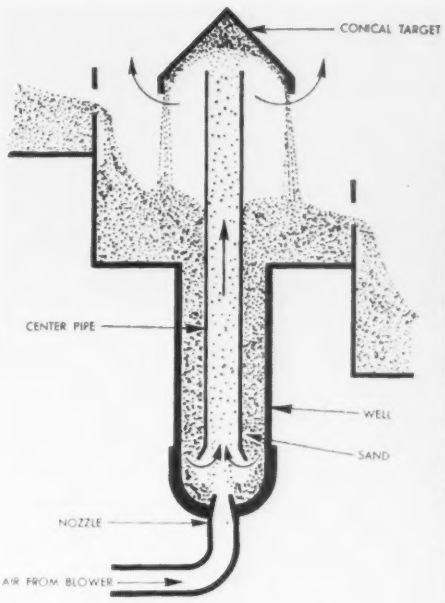
For More Details Circle No. 6—Page 249

Release Agent: R. M. Hollingshead Corp., 840 Cooper St., Camden 2, N. J.—Shell mold release agent is stated to give rapid, clean release from pattern plates with little or no buildup on molds. Manufacturer claims that its production advantages include lack of excessive build-up in crevices or other irregular surfaces; uniform coverage; clean molds; elimination of preliminary break-in or prelubrication of patterns, and smoothly and accurately maintained mold dimensions. The release agent is said to permit an increased number of operating cycles per operation. A water emulsion, it does not contain toxic or inflammable solvents, is non-corrosive to metals, does not produce objectionable odors and is stable in the drum and in diluted solutions.

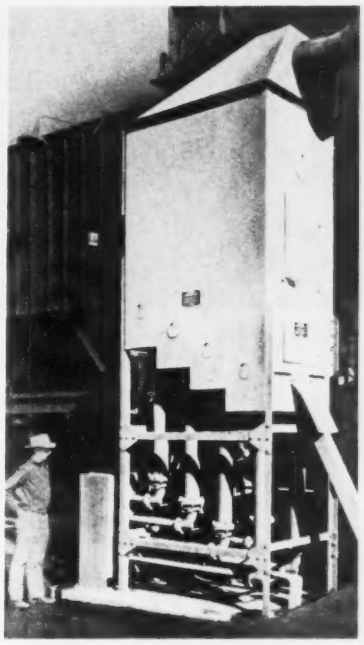
For More Details Circle No. 7—Page 249

Mercury Lamp: Westinghouse Electric Corp., MacArthur Ave., Bloomfield, N. J.—Mercury lamp rated at 700 w gives 35,000 lumens initially and has recommended minimum mounting height of 24 ft. Av-

Sand Reclamation Unit Scrubs Sand with Air



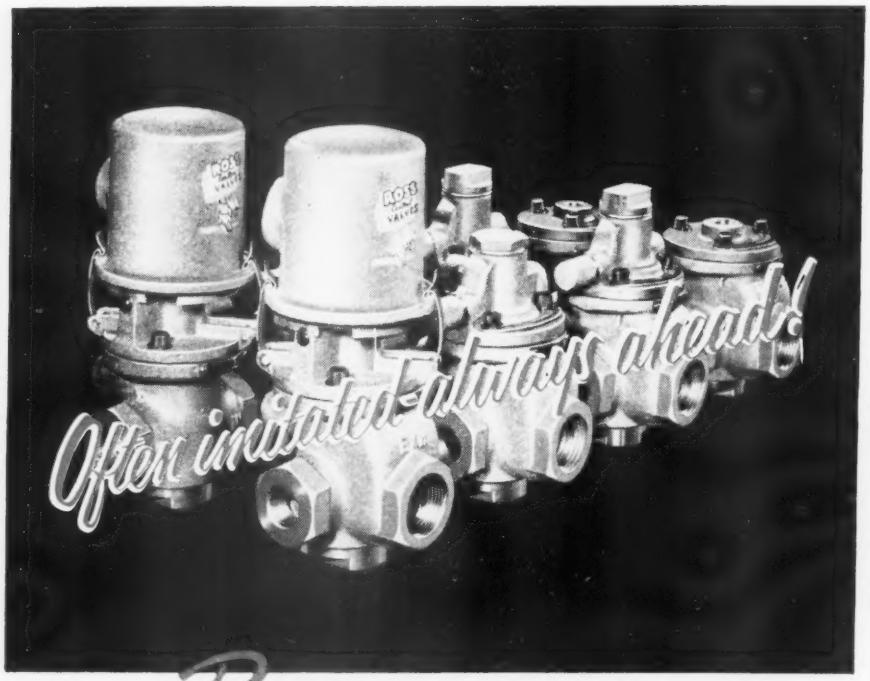
SAND SCRUBBING CELL



SAND reclamation unit made up of a variable number of scrubbing cells uses a turbine type blower to supply each cell with a high-velocity air stream. The air-sand mass is hurled upward through a vertical center pipe to collide with other grains entrapped within the peak of a conical, skirted deflector. Sand grains fall back to the main sand mass and become available for recirculation while motivating air escapes upward to emerge in exhaust from scrubber cell. Control over the degree of reclamation is maintained by adjustment of the feed rate to control the average number of cycles an individual sand grain receives as it traverses the sequence of cells. Escaping motivating air takes with it all fines and air floatable particles of "shell" debris. Elimination of fines is regulated by control of exhaust velocity. Standard eight-cell unit is designed to process 1 to 2 tons per hour of a quality of sand compatible for use in oil bonded core sand mixtures. For less critical molding sand mixes and where it is advantageous to leave part of the clay on the grain, this unit can be operated at a rate of from 3 to 6 tons per hour. The turbine type blower is powered by a 60-hp motor and has 2100-cfm output. Manufacturer is National Engineering Co., 608 Machinery Hall Bldg., Chicago 6.

For More Details Circle No. 8—Page 249

IF IT'S A VALVE FOR FOUNDRY WORK— ROSS HAS IT



Ross In-line Valves

The reputation and performance of Ross In-line Series Valves are so outstanding that imitations are constantly being attempted. Through constant improvements, the Ross In-line Series remains the leader and the envy of the trade. Here's why—

- *Dependable*—10 to 20 million maintenance-free cycles, and many more tens of millions of life-cycles, are not uncommon.
- *Speedy*—split second operation; oversized exhaust.
- *Low current consumption for solenoid models*—inrush of 1.2 amps @ 110 60.
- *Positive seal*—poppet construction; Hycar seats.
- *Easy maintenance*—only a few moving parts; can be disassembled without breaking line connections — solenoids readily accessible.
- *Many modifications*—vacuum, air, and liquid service; various pressures; available for AC or DC solenoids or air actuation with or without sequence timing; interchangeable heads.

Write for full information on the Ross In-line Series

ROSS Control VALVES

Ross OPERATING VALVE COMPANY

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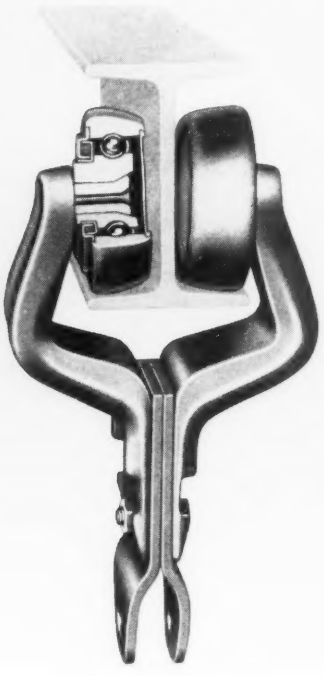
erage rated life is 4000 hr. Lamp may be operated from 460-v circuits with a simple choke and from other voltages with a suitable ballast which also acts as a transformer. Isothermal bulb shape provides approximately even operating temperatures over the entire bulb wall. Lamp will burn in any position and is designed to start readily at low temperatures.

For More Details Circle No. 9—Page 249

Trolley Conveyor: Mathews Conveyer Co., Ellwood City, Pa.—New 4-in. trolley conveyor is designed for all general trolley work. Wheel is made with steel or felt seals with

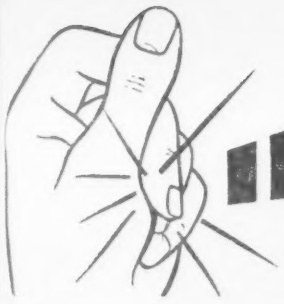


inner and outer races hardened. Chrome steel balls are retained in a pressed steel cage. Outer ball races are ground. Tire surfaces are hardened by a special process. Hooks, trays or any other type of load carrier can be applied to the chain.

For More Details Circle No. 10—Page 249

Diamond Blades: Robert G. Evans Co., 6315 Brookside Plaza, Kansas City 13, Mo.—Diamond blade with 50 per cent more diamond and metal powder than used on previous models and with cutting segments on the rim 50 per cent deeper is said to give 50 per cent more cutting life. It is especially suited for cutting glazed brick and tile, terra cotta, sewer pipe, stone, quarry tile and acid brick. Manufactured with a solid steel center, these blades are available in diameters of 6 to 30 in., and types are available for masonry, power hand and concrete saws that have been adapted for wet cutting.

(*Continued on page* 251)



IDEAS FOR FOUNDRYMEN

AVAILABLE FOR THE ASKING—This reader-service is designed to provide foundrymen with "idea" and reference material. Listings are selected from company product literature and reprints of special FOUNDRY editorial articles.

51. Not Just an Alloy

William F. Jobbins Inc.—Having a nominal composition of 3 per cent copper and 6 per cent silicon, 3-6 Supreme aluminum casting alloy features excellent mechanical properties and castability. A description with tabulated physical properties is offered in 4-page bulletin.

52. Phenolic Binder

Reichhold Chemicals Inc.—Foundrez 7101 is a water-dispensing synthetic resin of the phenolic type, specially developed for core sands. Technical bulletin F-1 gives properties, plus handling data, mixing cycles and formulations for various metals. Also tells how to bake your cake to the right "doneness", of cores.

53. Copper Oxides

Glidden Co.—Why use copper oxides in producing sound copper-brass-bronze castings? The answer is in data folder which also evaluates methods of maintaining oxidizing conditions during melting of copper and copper base alloys. Instructions for oxide's use are given.

54. Core Oil

Magie Bros., Inc.—Now here is a company that says it makes Hybond Core Oil which will mean less scrap, cleaner working, less smoke and gas, uniformity and lower costs to you in your foundry. And it has a Hybond oil to meet every requirement and any curve you want. Bulletin has 4 pages of information.

55. Tractor-Loader

Tractomotive Corp.—Model TL-10 TractoLoader with hydraulic torque converter drive and clutch-type transmission is subject of 6-page descriptive form 938. Unit has four speeds forward and four reverse. Illustrated folder lists specifications and highlights features. Interchangeable attachments include materials bucket, crane hook, lift fork and bulldozer blade.

56. Dust Demon Demolished

Dust Suppression & Engineering Co.—Mastery of dust doesn't need semesters of study. Air-Tumbler bulletin gives operational and installation data on a line of equipment that cleans air right at the dust source, keeps labor comfortable and efficient, combines low power requirements with minimum maintenance.

57. Band Saw

Tomlee Tool & Engineering Co.—A ball bearing machine constructed to withstand constant production use is the No. 47 metal cutting band saw. Specifications and list of accessories are given in available data sheet.

58. Refractory Products

National Foundry Sand Co.—Data sheets EFL-252, PB-352 and CSL-951 list various refractory products for furnace linings and trim, giving application details and data, plus case histories.

59. Love That Salesman!

Standard Pressed Steel Co.—Eight pages of cheerful informality called "We Love Salesmen" shows how company makes salesmen welcome, helps them by naming the right men to see, and gives them an idea of what is needed. We feel tempted to call ourselves.

60. Self-Cleaning Strainers

S. P. Kinney Engineers, Inc.—If you've been straining your budget with ineffective water and chemical strainers, 12 page booklet on Kinney and Brassert automatic and Kinney manually operated self-cleaning strainers may provide the "clear solution" to your problem. Operating capacities and the three models are tabulated.

Additional Information?

For additional information on any of the items described under "New Equipment and Supplies," "Trade Publications" or "Helpful Literature" in this issue—simply circle corresponding item numbers on one of these cards

7-53

FOUNDRY
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Please send literature or detailed information on subjects circled at left to—

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8	23	38	53	68	83	98	113	128	143
9	24	39	54	69	84	99	114	129	144
10	25	40	55	70	85	100	115	130	145
11	26	41	56	71	86	101	116	131	146
12	27	42	57	72	87	102	117	132	147
13	28	43	58	73	88	103	118	133	148
14	29	44	59	74	89	104	119	134	149
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7-53

61. Threaded Inserts

Rosan, Inc.—Insertion is easy with the threaded fasteners developed for die casting, permanent mold casting and injection molding processes. Should damage occur, replacement of the insert is simple and casting need not be scrapped. A complete line is available, and is described with servicing and installation data in bulletin R-100.

62. Many Machines In One

Tractomotive Corp.—8-page folder which opens up into sizeable wall chart shows 12 different attachments which can be mounted on the Tracto-Shovel and Allis-Chalmers HD-5G tractor. Conversion from shovel to trencher to bulldozer to angledozer to snow loader to drag bucket to crane to lift fork to bulk loader to snow plow (whew!) is possible. Tractor's hydraulic system, controls and main frames are illustrated and described.

63. Air Hoist

Aro Equipment Corp.—We could really blow off a lot of air on the merits of model 7700 Aro air hoist, but we'd rather let 6-page form 5313 do it. Briefly this 28½-lb dynamo will hoist loads up to 1000 lb at any speed from 0 to 40 fpm. That's hefty hoisting in any language.

64. Automatic Molding Unit

SPO Inc.—A typical schematic layout, plus a detailed photograph of the series MM Spomatic automatic molding unit is featured in 4-page bulletin MM. All operations of unit are fully automatic, mechanical and continuous.

65. Portable X-Ray Unit

General Electric Co. — "X-rays where you want them" is the way 4-page bulletin 8A-3424 describes the Resotron 250, a portable 250,000-v industrial x-ray unit which features a tube head weight of less than 150 lb, a diameter of less than 15 in. and length of 44 in. Full description with specs is given.

66. Vibrating Screen

Universal Vibrating Screen Co. — Get yourself out of the 'mesh' you're in with a Uniflex 24 x 36-in. high-speed vibrating screen described in bulletin 65. Unit vibrates 1800 times per minute and can be electrically or gas driven. Size range is 1 in. to 250 mesh.

67. Engineered Handling

Palmer-Bee Co.—An outline of this company's services to industry in the field of engineered materials handling is presented in 4-page bulletin. Company will plan, design, manufacture and erect unit production and bulk handling conveyor systems, lubricated-for-life conveyor equipment, auxiliary equipment, power transmission machinery, structures and plates and specialized equipment.

68. Electrode Stabilizer

Fred C. Archer, Inc.—You can insure low-hydrogen welds against defects caused by moisture-laden electrode shielding. How? Four-page bulletin descriptive of the Blueweld low-hydrogen electrode stabilizer will give you the answer. Stabilizer keeps low-hydrogen electrodes truly low hydrogen.

69. Ladle Graphitizer

United States Graphite Co.—Number 8 graphite ladle additive for gray iron treatment is described in Engineering Bulletin No. 2. Procedures are given for using the compound to produce required results. Number 8 is potent.

IMPORTANT READING FOR FOUNDRYMEN

We have a limited quantity of the following reprints which we can furnish while they last.

70. Foundry Machine Trends

"Modern trends in Molding Machines and Core Blowers" is title of illustrated FOUNDRY reprint by G. E. Miller of Osborn Mfg. Co. which discusses strides made in both use and design of molding machines and core blowers since World War II. Article covers improvements in patterns and coreboxes, sands, flask equipment, jolt-squeeze-strip machines and automatic controls as well.

71. Foundry Modernization

Now available as FOUNDRY reprint is article "Modernization Without Mechanization" by L. B. Knight which was presented before 1951 International Foundry Congress in Brussels. Author tells how malleable and gray iron castings are made at Dalton Foundries, Inc., pointing out that various operations can be modernized without complete mechanization.

72. Metal Solidification

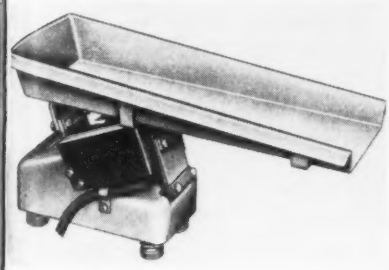
Problems in gating, feeding and chill application are more easily solved when metal solidification process is understood. Studies at Naval Research Laboratory, disclosing valuable additional information on this subject, are described in FOUNDRY reprint "Solidificiation of Metals" by H. F. Bishop and W. S. Pellini.

(*Continued from page* 248)

olor code on each blade indicates hat kind of material—soft, medium hard—it is to be used on. Each ade is given a rim coating of protective plastic and packaged in a etal storage container.

More Details Circle No. 11—Page 249

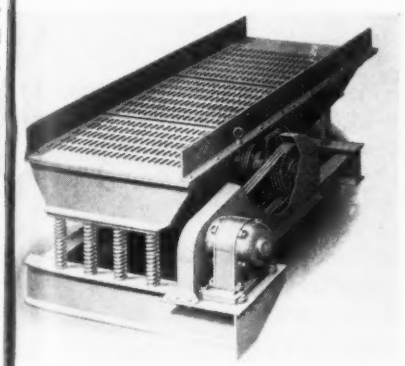
Vibratory Feeder: Syntron Co., 0 Lexington Ave., Homer City, Pa. Small, electromagnetic vibratory eder with maximum feeding capacy of 2 tons per hour has been added



the company's line. Electromagtic design eliminates use of rotatg working parts such as gears, ns, belts and chains. All action is fined to replaceable leaf springs. gulation of the material flow out of feeder is governed by a rheostat the feeder's controller. Unit weighs lb and is furnished complete with own controller.

More Details Circle No. 12—Page 249

Shakeouts: Link-Belt Co., 307 orth Michigan Ave., Chicago 1 — edium duty shakeout in four sizes ith capacities up to 5000 lb has en added to the company's line of



eavy duty shakeouts, which come n six sizes with capacities ranging rom 10,000 to 30,000 lb. All are said o provide fast separation of castings rom flasks and molds, to hasten reuction of sand lumps, to reduce flask amage and to simplify reclamation f reinforcing rods, gaggers and sprues. Provision is made to limit motion effectively during acceleration and deceleration, thus eliminating the hazard of destructive vibration during the critical speed range. Full floating, completely enclosed vibrating mechanism is reported to operate

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STANDARDIZED, MASS PRODUCED **Series "D" All-Electric 'Load Lifter' Cranes are today's most advanced cranes for average industrial needs. No other crane built for the same service is available at the low prices of the 'Load Lifter'. Every type and capacity has design and construction advantages like those engineered into all "Shaw-Box" Heavy-Duty Cranes.**

DEPENDABLE PERFORMANCE **is the only measure of any crane's value. Series "D" 'Load Lifter' Cranes do not whip and skew, because three girder bridge construction assures maximum rigidity. The bridge and trolley wheels are fixed on axles that rotate on anti-friction bearings. Sealed housings protect all gearing and confine the oil in which it operates. Maintenance is minimized. Every practical use is made of ball or roller bearings for smooth, efficient service. Spotting is easy and accurate. Safety devices protect man, load, and crane completely.**

CAPACITIES FROM 1 TO 20 TONS **— three basic types and three trolley styles — are offered in the Series "D" 'Load Lifter' Cranes. Pendant-type push-button control is standard on floor-operated cranes; master switches are provided in cage-controlled cranes. Every capacity, type and style can be selected from Catalog 221. Write for a copy.**

'Load Lifter'® CRANES

MANNING, MAXWELL & MOORE, INC.
MUSKEGON, MICHIGAN

Builders of "Shaw-Box" and 'Load Lifter' Cranes, 'Budgit' and 'Load Lifter' Hoists and other lifting specialties. Makers of 'Ashcroft' Gauges, 'Hancock' Valves, 'Consolidated' Safety and Relief Valves, 'American' Industrial Instruments, and Aircraft Products.

dependably under severe dust and temperature conditions. Amplitude of vibration is controlled by varying segmental weights. Both medium and heavy duty models are available in either horizontal or self-discharging inclined types in all sizes.

For More Details Circle No. 13—Page 249

Magnetic Sweeper: Multifinish Mfg. Co., 2114 Monroe, Detroit 7—Rotating magnetic sweeper of large capacity unloads easily. Cover is stripped off and accumulated tramp iron poured into a collection box attached to the frame of the sweeper. Entire 8-in. circumference of the magnetic housing loads up with iron to a thickness of 1½ in. Clearance under housing is 1½ in., allowing large parts to be picked up. Standard widths range to 6 ft. Larger models also are available. Sweepers can be pushed or pulled manually or be attached to any vehicle.

For More Details Circle No. 14—Page 249

Shell Molding Equipment: Harry W. Dietert Co., 9330 Roselawn Ave., Detroit 4—Device tests shell mold materials for transverse strength and deflection. It includes a mold for forming four specimens ¼-in. thick on a hot pattern and a breaking fixture which attaches to the company's sand strength machine. A choice of 2 or 3-in. breaking length is provided. Complete information on hot or cold bending of the shell can be obtained by using the organization's strength deflection recorder in conjunction with this device, called the transverse accessory.

For More Details Circle No. 15—Page 249

Tractor: Moto-Truc Co., 1978 East 59th St., Cleveland 3—Tractor for moving four-wheel trailers or containers incorporates an electric-hydraulic clamping design that permits clamp to grip all kinds of trailers and hitches. Clamping and release mechanism is completely hydraulic. Lower, "toothed" clamp can be adjusted in or out, depending on the

position and height of the container or hitch. Upper clamp then comes down, and grip is completed. Tractor is made with either 12 or 18-v battery. Overall dimensions are 27 x 48 in. Drawbar pull is about 700 lb. The company's other standard design features also are incorporated in the unit.

For More Details Circle No. 16—Page 249

Scaling Hammers: Thor Power Tool Co., Aurora, Ill.—Air-operated weld flux scaling hammers featuring small, lightweight, streamlined design are 7¾ in. long and weigh 2⅛ lb, yet are reported to deliver the speed and power required to remove flux and spatter after welding. Exhaust air blown from four holes in the front of the barrel removes loose chips and scale so that surface visibility is maintained. Other applications include paint scraping, rust removal, wood chiseling, small casting sand removal and mold cleaning.

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You'll find two important reasons why Transite* Core Plates mean faster production: First, core makers can handle more plates with fewer trips. Second, Transite Core Plates are easier to clean . . . core wash, sand, etc., do not adhere to them as readily as to other core plate materials.

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They maintain accuracy — Transite Core Plates stay smooth through long, hard service. Foundrymen who have used them for years report minimum warpage.

For cores of large mass and small surface area, perforated Transite Core Plates are also available to eliminate green cores and reduce baking time. For full details write Johns-Manville, Box 60, New York 16, N. Y.

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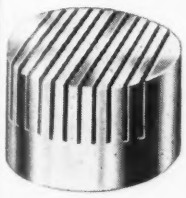
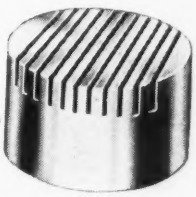
Made of Asbestos

SMILLIE
CORE BOX VENTS
"A Specific Type for Every Core Box"
Slotted



X-TRA DEEP HEAD
.156
Wide Slots
.014

DEEP HEAD
.093
Wide or Narrow Slots
.014 .010



SHALLOW HEAD
.031
Wide or Narrow Slots
.014 .010

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MOST ECONOMICAL METHOD for INSERTING CORE VENTS

- CORRECT DEPTH
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- FASTER INSERTION OF VENT

VENT CLEANER
FOR CLEANING SLOTS
- MADE OF TEMPERED STEEL
- EASY TO USE

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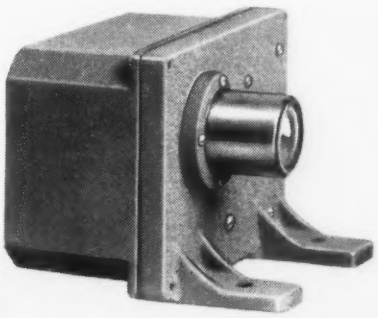
Three models have lever, push or button throttles. Straight, angle or mortar chisels can be used.

For More Details Circle No. 17—Page 249

Photoelectric Light: Autotron Co., Box 722-R, Danville, Ill.—Photoelectric light with dual filament lamp is said to provide positive protection against shutdowns, inconvenience and delay. When one filament fails, the other automatically begins to function, so that photoelectric control is not interrupted. Simultaneously, a signal lights up in the case to warn the operator that lamp should be replaced. Other features include an extra-low voltage connection for use when light source and photo-amplifier are less than 5 ft apart and a splash-proof case of cast aluminum.

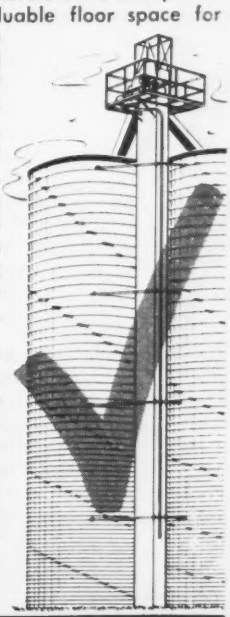


For More Details Circle No. 18—Page 249

Hand Truck: Magline Inc., Pinconning, Mich. — Magnesium hand truck with fully retractible third wheel is said to facilitate carting and wheeling of heavy loads. With the wheel extended, the truck can be operated in a three-point position, preventing any load from bearing on the operator. Similarly, the truck can be started without the physical effort normally needed to overcome dead load weight. For conventional use, the third wheel retracts against the frame. Nose unit of truck ex-

Modern foundries store core-sand in MARIETTA silos

If you still store core sand on your floor, it's time to modernize your sand storage system. MARIETTA concrete stave silos permit you to reclaim valuable floor space for productive use, put valuable core sand up in the air, out of the way, outside the building. MARIETTA silos give you better inventory control, improve working conditions, and lower handling costs by eliminating costly manual loading and unloading.



To learn how a large capacity MARIETTA concrete stave silo installation can improve your core sand storage method, write for catalog, convincing case histories.

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MARIETTA, OHIO
BRANCH OFFICES:
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Pulaski Hwy. at Race Road, Baltimore 21, Md.
805 Bessemer Bldg., Pittsburgh 22, Pa.

tends beyond wheels on either side, preventing flexible loads from binding against the wheels. Mechanically joined, all parts are replaceable when worn. No weld maintenance is required.

For More Details Circle No. 19—Page 249

Heat Detector: Fenwal Inc., Ashland, Mass.—Heat detector unit that actuates a shut-off circuit is said to eliminate the danger of fire around compressors and other belt-driven equipment. When a motor or belt overheats because of an overload, belt slippage, frozen shaft or other trouble, the malfunction generates heat which is carried to the detector by convection currents. Detector contacts, which control the power circuit through a 110 or 120-v solenoid, then open and cut the power to the entire compressor system. If the system is restarted without a rectification of the overheat condition, the power will cut off again as soon as temperatures return to the level at which the detector is set. Easily installed, the detector unit can be used with any type of belt-driven equipment on which the belt is enclosed so that heat is collected, rather than immediately dissipated.

For More Details Circle No. 20—Page 249

Copier: Industrial Sales Division, Eastman Kodak Co., 343 State St., Rochester 4, N. Y.—Unit produces three or even more copies of

letter-size papers from a single matrix sheet in 60 seconds for less than 5 cents a copy. Copies are same size, black-on-white duplicates of the original and are immediately ready for use. They are said to be long lasting, to have good legibility and to permit handling for any purpose desired. The machine uses a 110-v outlet. Copies can be made from practically any typed, written, drawn or printed original up to 8½ x 11 in., including material printed on both sides. The unit employs the "reflex printing" method.

For More Details Circle No. 21—Page 249

Magnesium Ingot: Dow Chemical Co., Midland, Mich.—Company is producing a new magnesium alloy ingot patterned to the needs of the commercial die casting industry. It contains beryllium additions for low melt loss and increased efficiency.

For More Details Circle No. 22—Page 249

Wire Rope: Jones & Laughlin Steel Corp., Gateway Center, Pittsburgh 30—Wire rope with coiled steel spring core combines good flexibility

with ability to resist crushing. Originally designed for use in rotary rig petroleum drilling, it has found ap-

HOW MUCH DO YOU KNOW ABOUT BERYLLIUM COPPER AS A CASTING ALLOY?

How would *you* react to the statements below?

BERYLLIUM COPPER IS GOOD FOR TOUGH MECHANICAL APPLICATIONS

Correct. Cams, bushings, gears, sleeves have been made of high-strength Berylco beryllium copper. Having tensile strengths from 140,000 to 180,000 psi, hardnesses from Rockwell C38-48, it compares favorably in strength and wear resistance with carbon and alloy steels.

IF BERYLLIUM COPPER IS A HIGH-STRENGTH MATERIAL, THEN ITS CONDUCTIVITY MUST BE LOW

Dead wrong. Berylco not only has good electrical and thermal conductivity, but is nonmagnetic and highly resistant to corrosion. Berylco 10, for instance, has a conductivity of 48-55 percent. It is unsurpassed for many current-carrying parts—switches, circuit breakers, welding jaws and electrodes, to name a few.

BERYLLIUM COPPER IS A FIRST-RATE INVESTMENT CASTING MATERIAL

And how! Because of its fluidity, Berylco beryllium copper gives better detail, closer dimensional control, and smoother surfaces. Makes it possible for the investment caster to produce blind holes, knife edges, narrow slots and long, thin cores without machining.

BERYLLIUM COPPER IS HARD TO HANDLE

Nonsense. Foundrymen successfully handling bronze will have no difficulty with Berylco beryllium copper. Its low pouring temperature (1000 degrees less than that of steel) simplifies procedure—makes it less costly, too.

BERYLCO BERYLLIUM COPPER CASTING ALLOYS are available in 5 lb., 2½ lb. and 3 oz. ingots. Send for your trial order today. If you think you'll have a problem, don't hesitate to say so. The chances are we have the answer to it here.

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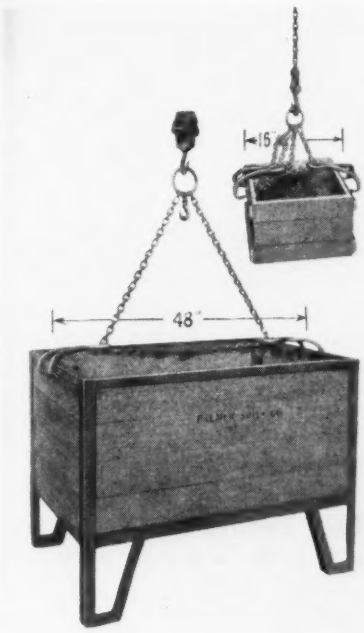
plication in many other fields, including its use as overhead traveling crane rope. Many points of contact between outer strands and the flexible core mean small amount of friction per point of contact. Firm internal support maintains good clearance between outer strands. Core resists crushing and distorting by flattening. Spring center snaps back after subjection to crushing and reduces fatigue. It can be used in wire ropes with diameters as small as ⅜-in. and as large as 2 in.

For More Details Circle No. 23—Page 249

Grab: Palmer-Shile Co., 16033 Fullerton, Detroit 27—Grab is engineered to pick up all types of heavy boxes, crates, bales or other loads on



which hooks can be used. Grip tightens as load increases. Heavy, forged steel hooks feature an adjustable spread that provides for handling of any load size from 16 to 48 in. Unit uses ⅜-in. BBB chains. Two sizes are available, with 1000 and 2000-lb capacities.

For More Details Circle No. 24—Page 249

Chilling Machine: Sub-Zero Products Co., Cincinnati 29—Low temperature chilling machine for cold testing is available in sizes from 1.5 to 4 cu ft and with temperature range from −10° to −120° F. It occupies 7.5 sq ft of floor space. Optional features available include circulators for air or convection fluid, a frostproof observation window, interior illumination and entrance ports in the lid. Either indicating or recording thermometers are provided. Temperature control is adjustable from plus 25 to minus 125° F. Control knob is located inside the instrument cabinet to prevent tampering. Entire

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Example of results... Shell molding with a new Durez resin of exceptionally fast cure and rigid set, replaced the conventional method of molding these aluminum castings. Dimensional accuracy of .003" on 16" was obtained. Output increased by 200%. Pattern-like finish with smooth contours and sharp definition of edges permits the castings to be used without clean-up.

On long and short runs, you can obtain the economies in time, space, sand, metal and handling that are inherent in shell molding with Durez resins. We offer you a resin that makes tough, hard shells for excellent general work, special resins for use where specifications require unusually fine castings, and a wetting agent that minimizes dust and segregation.

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PHENOLIC RESINS THAT FIT THE JOB

unit employs all-steel construction. Standard motors, controls and components are used throughout.

For More Details Circle No. 25—Page 249

Waterproofing: Monroe Co., 10703 Quebec Ave., Cleveland 6—Oil-base paint for waterproofing masonry surfaces is said to resist moisture on interior and exterior masonry for years with one application, without peeling, chipping, blistering or cracking. It contains a grit-like, volcanic ash filler which fills up small pores and stops capillary action. Available in seven colors, the paint requires no sizing and can be applied over unpainted or previously painted surfaces, wet or dry. The company claims that it will not chalk off, stain or fade. Ready mixed, it can be applied by brush or spray and resists lime, alkali, salt, mold and fungus.

For More Details Circle No. 26—Page 249

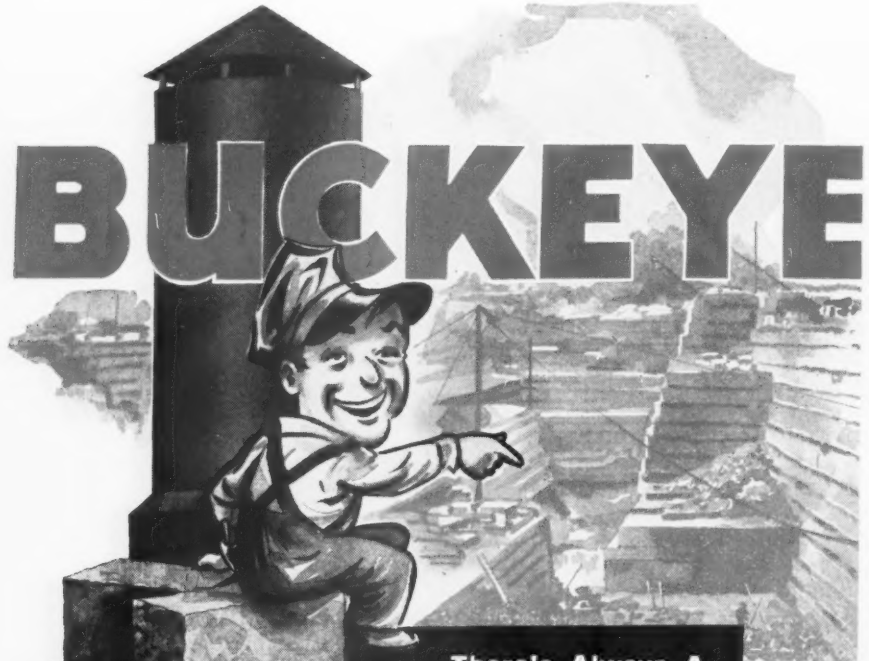
Core Dryers: Allis Chalmers Mfg. Co., Milwaukee 1—Company has added 15 and 25-kw units housed in identical components to its line of core dryers. Previously a separate component, the generator section has been integrated with the oven portions to facilitate assembly and improve installation. Dryers are 6½ x 20 ft, saving floor space and increasing available capacity per sq ft of floor area used. Other features include easy accessibility to all electric components and minimum maintenance requirements. Dimensions allow a loading and unloading area of 9 sq ft. Additional loading space to permit grouping coremakers around the infeed end of the conveyor belt can be attached easily at nominal cost.

For More Details Circle No. 27—Page 249

Fire Extinguishers: American-LaFrance-Foamite Corp., Elmira, N. Y.—Line of portable, carbon dioxide fire extinguishers with new, simplified, faster acting valve includes five models, in 2½, 5, 10, 15 and 20-lb capacities. The new valve has a removable siphon tube and protects the safety disk from damage by having a side rather than a top mounting. A double-prong locking pin with one prong slightly sprung prevents the pin from falling out while the extinguisher is being moved, thereby insuring against accidental discharge. These units carry the inspection and approval labels of Underwriters' and Factory Mutual Laboratories.

For More Details Circle No. 28—Page 249

Roof Ventilator: M & E Mfg. Co., 2571 Winthrop Ave., Indianapolis 5—Vertical discharge type automatic roof ventilators feature dampers that open automatically when fan begins operation, close tightly when operation is stopped. Exhaust air travels well above roof level, preventing reentry into the building. Detachable motor protection cover affords protection against weather hazards. Both fans and motor are readily accessible. Units are constructed of heavy gage steel, galvanized throughout. These ventilators are furnished completely



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Complete stocks of Buckeye Silica Firestone await your order. A whole quarry-full . . and then some . . guarantees adequate supply always! Best of all, this natural stone offers quality everytime . . there's no manufacturing guesswork—nature did this job!

Buckeye's adaptability to any cupola lining problem, its lasting quality, resistence to heat, and ease of handling make it the finest refractory you can use for economical operation. Hundreds of foundrymen, experienced in its use, recommend it.

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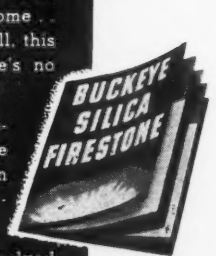

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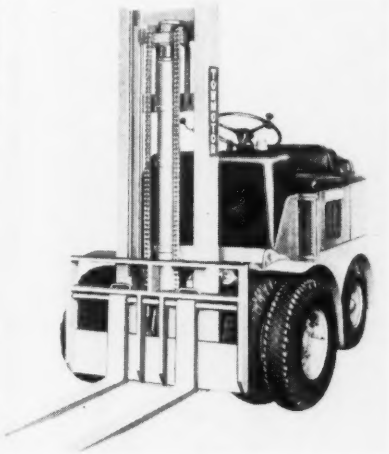
assembled and need only to be bolted to an unit. Special models can be furnished to meet individual requirements.

For More Details Circle No. 29—Page 249

Lift Trucks: Towmotor Corp., 1226 East 152nd St., Cleveland 10—Company now offers its model 480-P and LT-60 pneumatic-tired lift trucks with dual-drive wheels as optional original equipment. Mounted on the drive axle as replacements for standard single wheels, the dual-drive wheels afford more tread surface for safer handling of loads over soft



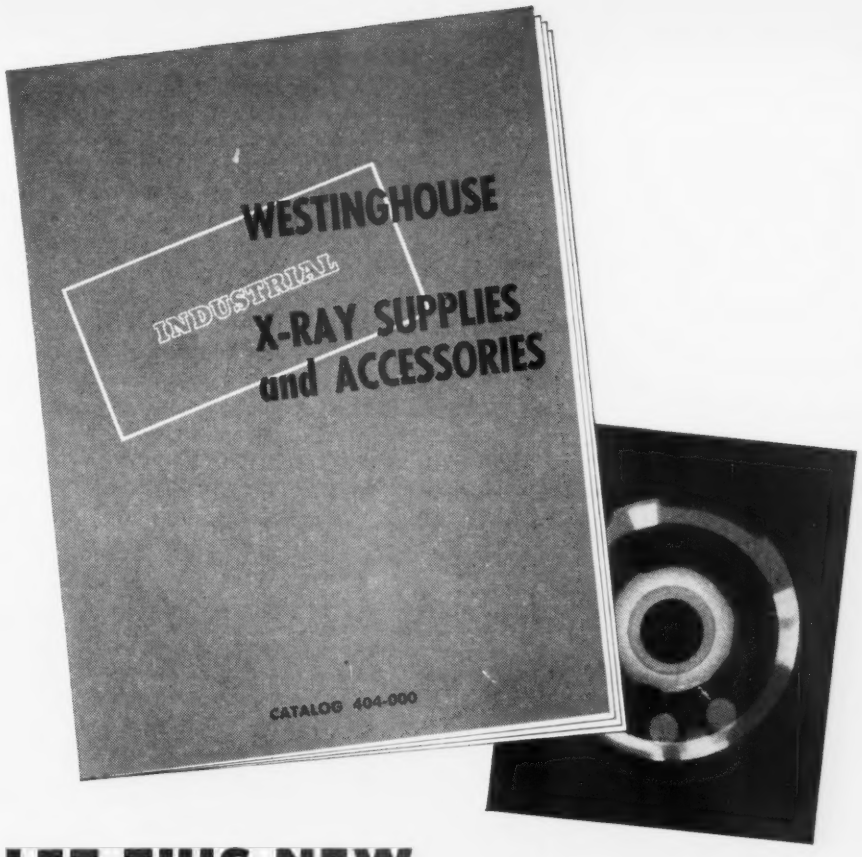
ground, and they insure greater stability of trucks equipped with extra high lifts. The dual drive wheels do not decrease the capacity of either truck.

For More Details Circle No. 30—Page 249

Electrodes: Arcair Co., 2614 Burwell St,. Bremerton, Wash.—Electrodes of special carbon-graphite composition have been developed for use with the firm's gouging and cutting tools. The carbon and graphite are blended to give superior arc stability and the most desirable combination of properties. Electrodes are available in both plain and copper coated types, the latter in sizes down to 3/16 and 5/32 in. diam.

For More Details Circle No. 31—Page 249

Air Hoist: Aro Equipment Corp., Bryan, O.—Roller chain type air hoist powered by rotary vane air motor weighs 27½ lb and has rated capacity to lift 1000-lb load at 40 fpm. Operator can regulate the rate of lift by throttle control that is infinitely variable from 0 to 40 fpm. Hoist is said not to slip down before going up. Vane type motor permits the load to be lowered under complete control at speeds exceeding 100 fpm. Safety features include explosionproof operation; safety snap hooks, top and bottom; adjustable safety stops on chain limit lift and



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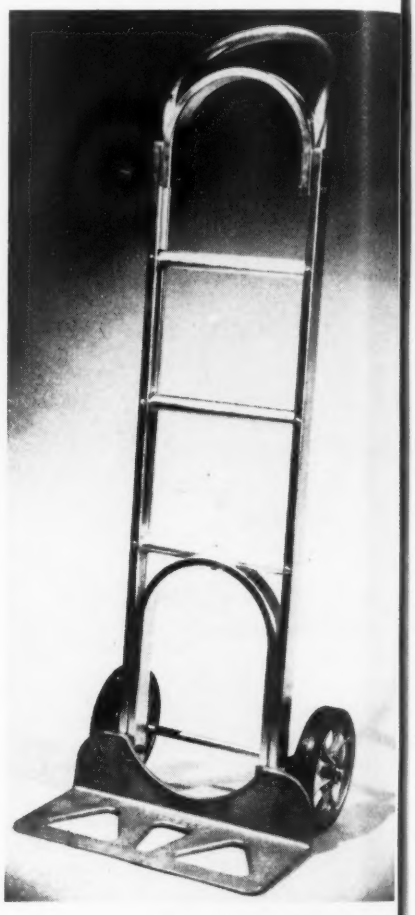
descent; and a safety brake that locks automatically when the control is released. All parts are designed with a safety factor in excess of the rated capacity of the hoist. Motor cannot burn out, according to manufacturer, even if stalled indefinitely.
For More Details Circle No. 32—Page 249

Miniature Cupola: Foundry Rubber Inc., 6100 River Rd., Washington 16, D. C.—All-steel 3-in. cupola furnace is intended for melting ferrous and nonferrous metals and reducing ores on a laboratory scale. It offers such features as rammed monolithic lining, six silicon carbide-lined tuyeres, two silicon carbide-lined spouts, ten clay botts for the metal and slag tapholes, stack crucible for easy melting of nonferrous metals without contamination, five external tuyere plugs and an eyepiece for viewing the melting process. Other available accessories include eyepieces placed at any levels, potentiometer plugs, gas sampling valves and extra well capacity. Operating on coke and compressed air, the cupola has a production capacity of 60 lb of cast iron per hour. Melting can begin after a 20 to 30-minute preheating period. The use of a plug-in, motor-driven blower to replace the compressed air blower is being evaluated currently.
For More Details Circle No. 33—Page 249

Hand Truck: Magnesium Co. of America, East Chicago 19, Ind.—Magnesium hand truck weighs 18 lb



and has capacity of over 500 lb. All-bolted construction facilitates easy replacement of parts. Its combination of light weight and heavy duty capacity is said to make it especially useful on delivery trucks as well as in general factory, warehouse and loading dock applications.
For More Details Circle No. 34—Page 249

Variable Speed Drive: Reeves Pulley Co., Columbus, Ind.—Variable speed mechanical drive can be mounted in almost any position around the driven equipment, can drive in any direction and can deliver any desired speed within a ratio of 8 to 1. Driven shaft may be located anywhere around the motor shaft, and the speed control handwheel may be located parallel to or in any of eight positions perpendicular to the motor shaft. Belts of six different lengths offer a wide choice of shaft center distances. Available in ½, ¾ and

FLEXI-GATE

can Save You Money!

FLEXI-GATE is a revolutionary, new gating material developed to eliminate costly cutting and fitting. FLEXI-GATE is a flexible material which may be molded to fit any pattern simply by bending to the desired angle.

THIS IS HOW FLEXI-GATE IS APPLIED:

1. Indicate on pattern board where runners are to be placed.
2. Nail Flexi-Gate in place with small head nails which disappear into surface.
3. Curve to fit pattern, making corners either horizontally or vertically.
4. Set fillets in usual manner at point where gate enters head. They are not required along the gate.
5. Apply same coating to gate as to pattern before sending to molding floor. (We recommend Mabco Clear Core Box Paint)
6. To remove from Pattern Board simply pull off—small head nails will pull through without damaging Flexi-Gate.

Bend freely to fit your requirements

There is a size Flexi-Gate to fit your needs

FLEXI-GATE has proven its worth in actual production. It has eliminated necessity of cutting gates for each pattern. Flexi-Gate has your pattern into production faster and at less cost.

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HOUSTON DENVER

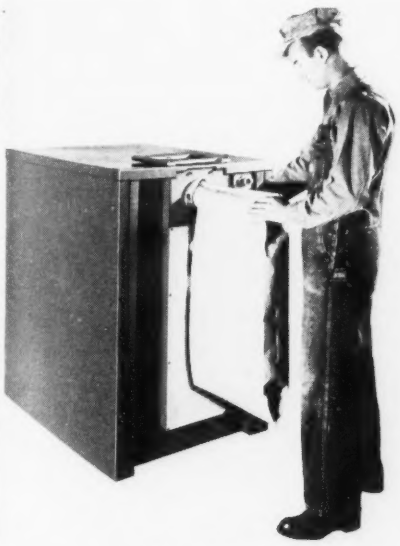
1-hp capacities, the drive is said to be adaptable to essentially all industrial applications, including those with in-line or right angle reducers, countershafts and chain and sprocket or V-belt drives.

For More Details Circle No. 35—Page 249

Power Units: Ready - Power Co., 3826 Grand River, Detroit—Range of sizes in diesel-electric and gas-electric power units is said to meet the requirements of all sizes and types of electric industrial trucks. Diesel-electric units for use with fork trucks of 4000 to 6000-lb capacity and for platform trucks up to 10,000-lb capacity are included, as well as other models. These units are said to offer simplified preventive maintenance; ready availability of power; easily operated standard electric controls; durability, and low operating costs.

For More Details Circle No. 37—Page 249

Bag Packer: E. D. Coddington Mfg. Co., 5086 North 37th St., Milwaukee 9, Wis.—Valve bag packer fills bags of 25 to 100-lb capacity with any free-flowing substance from powder to pellets. Unit has pushbutton controls, and fully automatic operation includes weighing device with secondary adjustment wheel designed to assure accuracy in every weighing operation. Either single or two-speed motor is available. Over-all height of 45 in. permits placement under tanks,



hoppers or other feed lines. Long-nosed spout eliminates dust and dirt during filling of the bags. A multiple auger, especially designed to handle the materials for which the packer is to be used, can be removed easily for cleaning. With an adapter, the unit can be used to fill barrels and open-mouthed bags. It packs a 100-lb bag in from 6 to 10 seconds.

For More Details Circle No. 36—Page 249

Gamma rays.....
unexposed film.....
steel casting.....

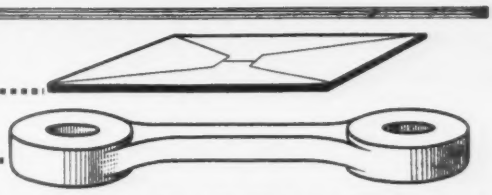


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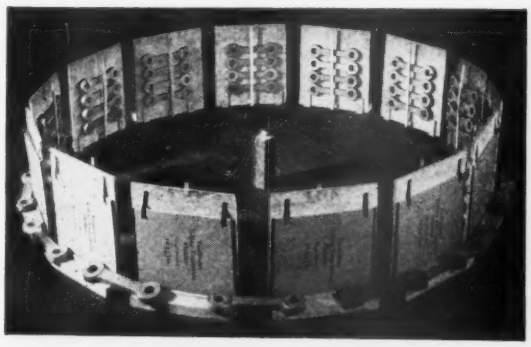
Illustration shows 60 steel castings being photographed simultaneously. The gamma rays, flying in all directions, go through all the castings at once, making 60 exposures of the 60 castings



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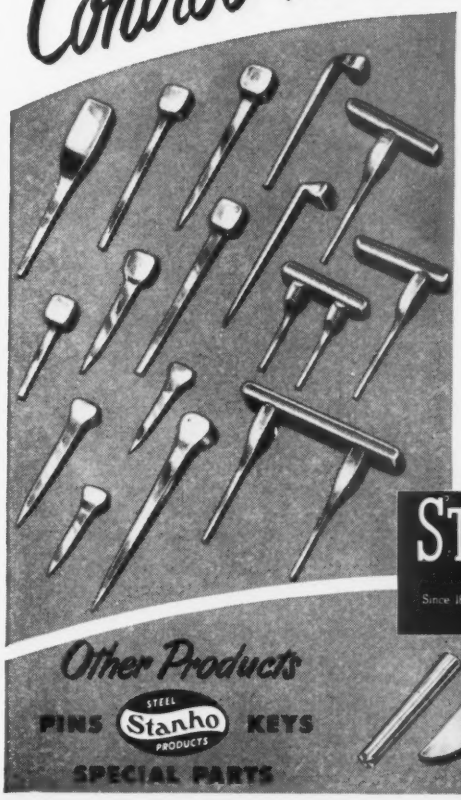

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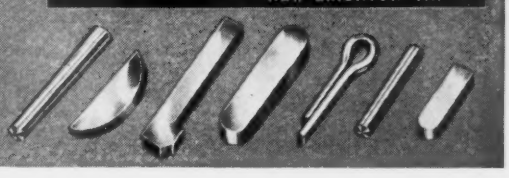

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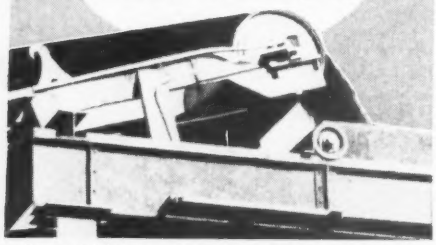

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Effects of Vibration

(*Continued from page* 105)

approach and draw the grain size bands through a spread of largest and averaged measured grain diameter. Comparative macrostructures in the region between 2-3 in. from the bottom of the ingots are shown in Fig. 2.

As may be expected, increasing copper contents act to refine the cast grain size somewhat in the slow cooled ingots. The comparative refinement as a result of vibration during solidification is most pronounced in the region of 1-5 per cent copper. Thereafter the differences in grain sizes are progressively less pronounced. Fortunately, the commercially useful forging and casting alloys lie within the compositional range of most effective grain refinement.

Effect of Rate of Solidification on Grain Refinement—Alloys containing 0, 1, 2, 3, 4, 5 per cent copper, respectively, were cast into unpreheated molds to give a rapid solidification rate. Both vibrated and control ingots were cast.

Chill casting itself is a common method of grain refinement. However, this method can only be applied when the alloy is not prone to columnar grain growth. Columnar grain growth imparts serious directionality to mechanical properties and planes of weakness to a cast shape. The grain size measurements on control and vibrated ingots are summarized in Table I.

The following conclusions may be drawn from these results: (a) while chill casting itself can effect a considerable refinement in as-cast grain sizes, the simultaneous application of vibration during solidification can produce additional refinement. (b) Vibration acts strongly to reduce the penetration of columnar type grain growth during solidification. This effect is of considerable importance to the production of cast sections for subsequent working or where directionality of properties is critical.

Effect of Vibrational Intensity on Grain Refinement—On all previous work, the full vibrational output of the pneumatic vibrator had been used to achieve the effects reported. However, the violence of the imposed vibrations was relatively impractical in commercial founding except perhaps in the case of permanent molds. It is therefore of some importance to know by what type of relationship refined grain size is dependent on vibrational energy.

The variation of vibrational energy was achieved by varying the air pressure fed to the pneumatic vi-

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brator. The actual effect this had on the rapping frequency and rapping force is difficult to say, but the frequency-amplitude product was definitely reduced in a manner proportional to the air pressure reduction.

The results of a series of experiments are given graphically illustrated in Fig. 3. It may be noted that the greatest change in active grain refinement occurs in the range 0-12.5 psi air pressure and that thereafter the benefits of increased vibrational energy are small. These results lend promise to the feasibility of applying vibration to commercial founding practice.

Effect of Reduced Cross-sectional Area on Grain Refinement—A series of aluminum-copper alloys were cast into 1½-in.-diam molds and solidified slowly. Every attempt was made to provide the same solidification time as with the larger ingots. The intention was to investigate whether the reduced cross section affected the grain refining ability of vibration. Compositions from 1-9 per cent copper were used. Both vibrated and control ingots were poured from the same melt. The grain size measurements are summarized in Table II.

Generally the vibrated ingots exhibited a fine grain size comparable to the larger ingots. However, the control ingots were not as coarse as the 3½-in.-diam ingots also solidified without vibration. The comparative benefits of vibration are therefore not as pronounced.

It may also be noted that the smaller diameter ingots showed a much higher frequency of internal defects—hot tearing and gross cavities. These, of course, resulted from the high vibrational intensity, and the necessity for a reduction in intensity must be regarded as more pressing with decreasing cross section.

Effects of the Nature and Shape of Primary Crystallites—Most previous investigators have chosen to regard the origin of grain refinement by vibration as deriving from a fragmentation of primary crystals due to imposed alternating flexural stresses. It should be noted that this has been only a hypothesis with little direct experimental evidence. Since the vibrating apparatus used has been shown to be capable of causing pronounced grain refinement, the opportunity was taken to see if any significant change in primary crystallite size could be produced when the crystallite was of a distinctly brittle nature.

Two alloys were chosen. An aluminum alloy containing 7 per cent iron

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rejects needles of brittle $FeAl_3$ as primary crystals. A commercial 13 per cent silicon alloy solidifies largely as a eutectic of aluminum and elemental silicon. The silicon usually develops in the form of platelets or needles. Both slow cooled and chill cast ingots were cast, with and without imposed vibration.

Figs. 4 to 7 show two sets of comparative microstructures. In both cases, it is evident that vibrations imposed during solidification have not reduced the primary crystallite size. In fact, the random occurrence of abnormally large $FeAl_3$ needles was greater in the vibrated ingot than in the control ingots. In Fig. 5, the strong tendency towards "divorced" eutectic of the silicon alloy may be noted. These results may be taken as evidence against the fragmentation theory of grain refinement, at least under the conditions of the experiments.

Other Effects Associated with Use of Vibration

Chemical Segregation — Chemical analyses were conducted on the set of ingots (3¼ in. diam x 5 in.) solidified slowly. Analyses were taken from samples cut from three positions in each ingot: 1½ in., 2½ in., 3½ in., respectively, from the bottom or chilled end. The purpose of these analyses was to determine whether gross chemical segregation effects were accentuated by the action of vibration during solidification. The degree of segregation was empirically estimated as the deviation from the mean copper-content in the control ingots (i.e. solidified without vibration). The results are presented in Fig. 8 for the 2½-in. position in the ingots.

Considering that the 2½ in. position was relatively free of the chilling effect of the ingot mold base, it appears that gross chemical segregation is maximum in the range 5-7 per cent copper. Reference to the Al-Cu phase diagram will show that this composition range corresponds to the region of maximum difference between liquidus and solidus temperature. At the chilled end and to a lesser extent in the 2½ in. position, a second trend of deviation appears above 10 per cent copper. Its origin is unknown but since this represents a region beyond commercial alloy compositions, it is of no immediate interest.

Microstructures — Coupons cut from identical positions in all ingots from the set which were solidified slowly were prepared for metallographic examination. A study of the microstructures revealed the following:

(a) A pronounced break up of the dendritic pattern as a result of vibration during solidification. Figs. 9 to 14 show comparative microstructures for 2, 3 and 5 per cent copper compositions. It will be noted that the "vibrated" structures are almost equiaxed.

(b) No significant increase or decrease in coring. Apparently vibration during solidification has no appreciable effect on the form and displacement of the anisothermal liquidus and solidus phase boundaries.

(c) A pronounced tendency towards "divorced" or "segregated" eutectic structures in the vibrated specimens. Eutectics in both Al-Cu alloys (see Fig. 14) and in the Al-Si alloys (see Fig. 5) exhibit this effect. Apparently the vibration assists the deposition of part of the eutectic on to the primary dendrites already established. The presence of an almost continuous network of coarse $CuAl_2$ in the Al-Cu alloys may be expected to seriously affect mechanical properties unless eliminated by heat treatment.

Surface and Internal Imperfections—It was a general observation that vibrating imposed during solidification produced inferior surfaces on the cast ingots. In part, however, this might be regarded as characteristic of the experimental conditions and not necessarily as an insolvable problem.

Evidences of hot tearing were noted rather frequently in vibrated ingots. The hot tearing generally formed a pattern concentric with the external surface but inside the ingot to a depth of ½ in.-1 in. It seems probable that these defects can be reduced with less intense vibrational energy.

Summary and Discussion of Results—The imposition of vibrations during the solidification of alloys has been shown to cause three significant effects:

(a) A refinement of the as-cast grain sizes. The degree of refinement is subject to a number of governing conditions.

(b) A reduction in the depth of columnar grain growth during solidification.

(c) An accentuation of the divorcement of intermetallic compounds from eutectic mixtures which form during solidification. In the case of alloys where the eutectic liquid remains as a thin inter-dendritic film, the compounds form semicontinuous networks. In the case of alloys which are predominantly eutectic in structure, the result is a general divorcement of the structure.

The degree of grain refinement induced by vibration during solidifica-

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tion has been found to be subject to the following conditions:

(a) In any one alloy system, grain refinement is most effective at low alloy contents. That is, the normal grain refining influence of increasing alloy content acts to reduce differential effects.

(b) Refinement is most effective when the rate of solidification is small. Again, since rapid cooling is itself a recognized method of grain refining, the simultaneous use of vibrations can only be expected to exert comparatively little extra benefit.

(c) The ability of vibration to induce grain refinement is not impaired as the cross-sectional area of the solidifying melt is reduced.

(d) The relationship between vibrational intensity and grain refinement may be regarded as approximately parabolic in form. That is, above a certain intensity level, little additional grain refinement is achieved.

(e) Grain refinement seems possible only in those alloys which are predominantly solid solution in structure. Little or no benefit seems to accrue from applying vibrations during the solidification of predominantly eutectic alloys under the conditions used.

(f) Grain refinement is not critically dependent on frequency in the range 0-1000 cps but rather on the frequency-amplitude product. Moreover, ultrasonic frequencies are not necessary to produce effective results. Therefore, the choice of vibration generators is less critically restricted.

Vibrating Is Useful Factor

In summary, it would appear that vibrations during solidification may be considered as a useful factor in the solidification of relatively large volumes of metal of the low alloy content type. Conditions of small section and chill casting may not be expected to exhibit as significant additional grain refinement. The prevention of columnar growth, however, is a singular benefit. These conclusions imply that vibration techniques should not be regarded as an overall cure to foundry ills but rather as a technique which will show advantage under certain specific conditions. The ability to refine the grain size of large volumes of metal which cannot be solidified other than slowly, places the vibration technique in a unique position.

The suppression of columnar growth by vibration should be a factor of considerable interest to manufacturers of ingots for subsequent forging or rolling.

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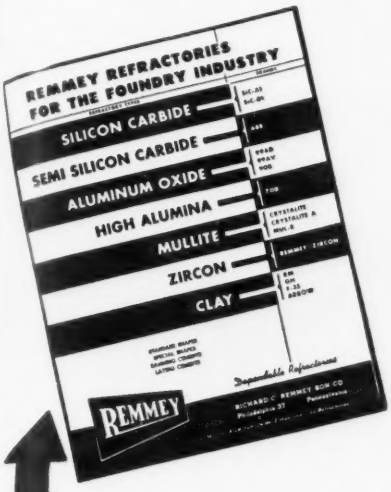

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Acknowledgements—Gordon Johnson acted in a supervisory capacity. Louis Johnson was associated with the work performed. Cornelius Johnson was responsible for the metallographic work. The authors wish to express gratitude to the Frankford Arsenal for sponsorship of this work and for permission to publish the results.

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Harry W. Dietert Co., Detroit, will hold a three-day Sand School Aug. 10-12 at the Detroit Engineering Society, Woodward & Warren Aves., Detroit. No charge will be made for the course, which is fashioned particularly for foundry supervisory and technical personnel.

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The lectures, which will be illustrated, will be given by Frank S. Brewster, vice president-general manager, Harry W. Dietert Co.

Book Review

World Production of Raw Materials, paper, 104 pages, 5½ x 8½ in., published by Royal Institute of International Affairs, 542 Fifth Ave., New York 19. Price $1.50.

A completely revised edition of the work under the same name originally published by the Royal Institute in 1941, the present volume is divided into three sections, "Survey of Raw Materials," "Notes on Sources and Uses of the Materials" and "Tables of World Production," the booklet deals with synthetic raw materials as well as with agricultural and mining and quarrying products.

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(*Continued from page* 111)

tain air circulation, it has been found that a covered furnace filled with metal at pouring temperature (about 2900° F) can stand as much as 3 hours without injury, even with heating current off. During this period, the metal cools slowly, of course, but remains liquid. To keep the blowers operating, in the event of power failure, a small gasoline driven three-phase alternator is provided. It can be thrown into use instantly if needed.

If a furnace must be shut down for relining, all metal save that below the hearth is drained out and the furnace is allowed to cool, after which all refractory and metal that has frozen in the heating passage are chipped out. Relining is similar to that in other high temperature furnaces except that a separate form of metal or wood is used to produce the heating channel. It takes 3500-4000 lb of electrically fused alumina ramming refractory cement plus about 4 per cent of water for a relining job. This does not include the cover, since this part rarely requires relining.

It takes two men about 12 to 16 hours to do relining. They ram the lining with air hammers but do not require special skill if they are careful and are properly supervised. Ramming of refractory is done after insulation is put in place. When ramming is completed, the furnace makers advise drying at room temperatures for 3 to 4 weeks but, in this plant, the drying is done in three days by applying heat generated by a gas flame playing inside the furnace and directed toward the hearth.

Lining Dried Quickly

To facilitate this heating, a 2-in. pipe is attached to a cap made to fit the blower outlet. An aspirator valve for natural gas is attached to this pipe and is adjusted to give a suitable gas-air mixture that burns as it leaves the end of the pipe directed from above toward the hearth. Resulting heat warms the hearth and furnace walls as well as the linings below the hearth and does so without apparent injury, judging by the long life of linings. In any event, the preheating of linings makes it possible to put the furnace back into use in about 4 to 5 days including the time for relining. This saves two to three weeks compared with air drying.

Total cost of relining is about $600, of which about three-fourths is for materials and the remainder for labor. This cost is quite small, es-

pecially in relation to the tonnage of metal melted per lining. Low relining costs and reduced down time are among the major benefits of the low-frequency furnace installation. When this article was prepared, one of the furnaces operating continuously, had melted nearly 2422 charges without replacing linings and it is believed that even longer lining life will be attained. The accompanying table summarizes general operating costs.

Another pronounced benefit is the uniformity of metal produced. There is slight but uniform loss and no contamination of the metal. Aside from the slight loss in carbon, output composition is practically identical with that of the charge introduced. Furnace capacity is about 5,000 lb and, as only 400 lb are charged (and later discharged) at a time, the total metal in the furnace at one time represents some 12 separate charges fully mixed by the pinch-effect of the electric current.

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Average composition is about as follows: Carbon 2.3 per cent, manganese 0.35-0.40 per cent, silicon 1.10-1.25 per cent, sulphur, max 0.06 per cent, phosphorous, max 0.03 per cent, iron remainder.

An average charge includes 200 lb of sprues and returns, 100 lb of low-carbon steel scrap (generally from steel stampings in bales 12 x 12 x 12 in.) and 100 lb of malleable pig iron. If these do not provide the desired analysis, small additions are made to compensate. Usually, these are graphite and ferro-silicon but they are not needed if the pig and steel scrap available have the desired composition. Each charge is weighed and assembled in a special drop bottom bucket that is then transferred by monorail hoist and is lowered over a small charging buggy, one of which is provided close to the top of each furnace. Each buggy bottom is about 2 in. above the sand level and at one side of the cover, as shown in Fig. 4.

This charge sets in the bucket or on the buggy about 20 min at a temperature ample to drive off any moisture before charging. When the furnace is ready for charging, a tubular handle attached to the buggy is used to draw it back a few inches on its wheels. Then the cover is raised, as in Fig. 3, and the buggy is pushed forward by hand against a stop, causing the charge to drop into the molten metal below. Although this hand charging works well, it would be an easy matter to move the buggy by compressed air if a suitable air plunger and cyl-

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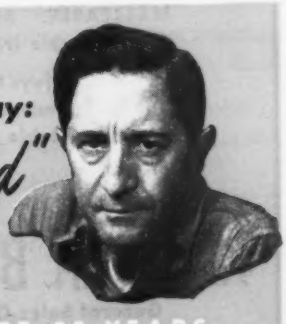

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inder were installed.

Some sparks fly as the solid meta falls into the molten bath, but the drop away from the operator, wh lowers the cover immediately afte the buggy discharges. Solid meta falls only a few inches into the bath which usually stands some 20 o more inches deep. If any of th charge strikes the hearth, the blow are light and have no effect so far a has been observed.

As soon as the operator closes th furnace, he presses a button tha starts the furnace on its melting cycle. Pressing this button brings in to play a contact mechanism in a kilowatt-hour meter and an impuls counter (Fig. 5). The latter is se for a given total energy input. Fo every kilowatt-hour of energy tha flows through the meter, the coun ter advances one impulse. Impulse are integrated until the total equal the setting previously made. Whe this total is reached, furnace inpu is automatically shifted from melt ing to holding position. This reduce the voltage applied and drops energy input to that needed to make u for standby heat losses. Pilot light indicate these changes and signa when the furnace is ready for it next charge.

Pouring Temperature Constant

No pyrometric control is applie to the furnace, as none is needed. A charges always weigh 400 lb and eac charge requires a definite power inpu to convert it into metal at pouring temperature in a given time, it i necessary only to set this input o the impulse counter to attain th desired result. An optical pyrometer is used initially to insure that meta at desired pouring temperature i produced, but, once found and set the pouring temperature remains be tween 2850 and 2950° F with the aver age 2900° F, as desired.

After each charge has been melted a like amount is drawn off, as i Fig. 6, by removing the plug previous ly pressed into the tap hole, where the plug is held by a rocking lever mechanism. Flow is by gravity an no tilting of the furnace is required This simplifies the furnace installa tion and there is no flexing of cables for power input.

Although furnaces commonly ar tapped each 20 min and then are recharged, departure from this tim ing often is required, especially when molding rates vary or foundry delays occur. Such variations have no ad verse effects on furnace operation however, because if foundry demands do not equal the normal melting rate the furnace controls merely shift au tomatically to standby position and

remain there until the demand for more molten metal requires the resumption of tapping.

In general, however, the foundry aims to supply molds ready for pouring (as in Fig. 7) in step with a schedule calling for 400 lb of metal each 20 minutes from each of the three furnaces, or a total of 3600 lb an hour.

Most molds are made by jolt-squeeze machines, transferred to belts and from belts are shifted to dollies on a merry-go-round pouring conveyor that passes a pouring platform near the furnaces.

Ladles are filled at pits adjacent to furnaces, as in Fig. 3, and are shifted by monorail hoists to the pouring platform, Fig. 7. At present, there is only one pouring platform served by one set of conveyors but plans call for early duplication of this setup, at which time more furnace capacity may be needed. If more furnaces are required, they will be of the same type that is used currently.

It requires only four men per shift to operate the three furnaces, fill ladles and do pouring. These men also weigh out and shift metal to charging buggies, charge the furnaces, tap the furnaces, shift ladles as needed, keep the ladle heated as needed, keep the ladle heated with a gas flame when not in use, and do all work required up to and including metal pouring.

Poured on Circular Conveyor

Molds are handled without jackets until they reach the pouring conveyor, where jackets and weights are added. These are removed, however, as soon as solidification occurs and are returned for reuse via a roller conveyor. Molds continue around the conveyor, on which cooling proceeds, until they reach a shake-out near the pouring platform. Castings are shifted from the shakeout onto a wire belt conveyor and continue along this for further cooling, pickout, clipping and inspection. Fig. 8 shows a group of castings typical of those produced.

All castings are in white iron, of course, and have to be put through annealing furnaces, Fig. 9, to convert the white iron to the required malleable form. This annealing is done in radiant-tube furnaces arranged in a row under a crane that lifts off and replaces the furnace shells (that include the radiant tubes) as needed.

Castings are stacked individually or in metal boxes in quantities sufficient to fill the furnaces before the shells are lowered and sealed. Then natural gas firing is started.

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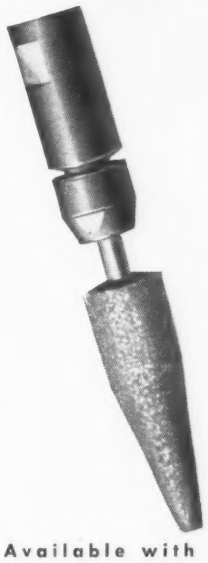

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Trade Publications

For more details on these items use reply card—page 249

DIELECTRIC CORE DRYERS: Allis-Chalmers Mfg. Co., 1032 South 70th St., Milwaukee—Article reprinted from First Quarter, 1953, issue of *Allis-Chalmers Electrical Review* explains the use of dielectric heat for drying cores. Written by Carl Loper of the company's electronics section and entitled "Curing Intricate Cores with Dielectric Heat," the article tells of the development of the dual heat core dryer and discusses preparation and curing of cores, core assembly and casting.
For More Details Circle No. 76—Page 249

MATERIALS HANDLING: Kornylak Engineering Corp., 513-521 Communipaw Ave., Jersey City 4, N. J.—Materials handling reference chart, 8½ x 11 in., suitable for either wall mounting or folding, describes the company's full line of materials handling equipment.
For More Details Circle No. 77—Page 249

HEAT TREATMENT: Meehanite Metal Corp., 714 North Ave., New Rochelle, N. Y.—Booklet entitled "Principles of Heat Treatment" uses numerous charts and photographs to explain annealing, hardening, martempering, austempering and surface hardening in detail as they pertain to the company's alloy. Equilibrium diagrams, dilation curves, "S" curves and Jominy curves also are explained.
For More Details Circle No. 78—Page 249

DESK CALCULATOR: Pangborn Corp., 1400 Pangborn Blvd., Hagerstown, Md. — Six-page, pocket-sized folder entitled "Desk Calculator" presents formulas, constants and conversion factors useful in basic engineering, blast cleaning and dust control calculations.
For More Details Circle No. 79—Page 249

SPECIFICATION HANDBOOK: North American Smelting Co., Marine Terminal, Wilmington 99, Del.—Fifth edition of the company's *Specification Handbook* is a 132-page compilation of the various specifications issued by government agencies and metallurgical societies on all standard brass, bronze and aluminum alloys and fabricated shapes. Fundamental data, tables, a chapter on physical properties and test bars, a list of various "named" alloys with their nominal chemical composition and specifications on solders and antifriction alloys also are included.
For More Details Circle No. 80—Page 249

TITANIUM: Mallory-Sharon Titanium Corp., Niles, O.—Booklet lists the general properties of titanium, standard product classifications and testing procedures and specific properties of the five types of titanium and titanium alloys that the firm supplies.
For More Details Circle No. 81—Page 249

SAND MIXER: Federal Foundry Supply Co., 4600 East 71st St., Cleveland 5—Bulletin WH-4 illustrates and describes sand mixer available in four models, with capacities of from 15 to 600 lb of core oil sand. Specifications are included.
For More Details Circle No. 82—Page 249

SELF - DUMPING HOPPERS: Roura Iron Works Inc., 1401 Woodland Ave., Detroit 11—Booklet illustrates various models of self-dumping hoppers for use with either platform or fork lift trucks and explains their operating and construction features.
For More Details Circle No. 83—Page 249

SPACE HEATERS: Dravo Corp., Heating Dept., Dravo Bldg., Fifth & Liberty Aves., Pittsburgh 22—Bulletin 543 illustrates a new line of suspended space heaters for use with any type of gas fuel and includes complete specification data with dimensions and capacities of both propeller fan and blower type units. Available output capacities range from 70,000 to 178,000 Btu per hour.
For More Details Circle No. 84—Page 249

FORK TRUCK: Baker-Raulang Co., 1250 West 80th St., Cleveland 2—Book gives full information about construction, operation and application of the firm's new gasoline-powered, electric motor-driven fork truck. Schematic diagrams and other illustrations help to tell the story.
For More Details Circle No. 85—Page 249

PLATE MAGNETS: Magnetic Engineering & Mfg. Co., Clifton, N. J.—Catalog 253-A illustrates Alnico permanent, nonelectric plate magnets and describes their uses, advantages and other features, including installation data.
For More Details Circle No. 86—Page 249

ROTARY HEARTH FURNACE: Hevi Duty Electric Co., Milwaukee 1—Bulletin 153 announces a new high-temperature rotary hearth furnace and discusses its construction features and operation.
For More Details Circle No. 87—Page 249

WELDING TORCHES: Linde Air Products Co., Division of Union Carbide & Carbon Corp., 30 East 42nd St., New York 17—Form 7979 presents details and specifications of welding torches for inert gas shielded

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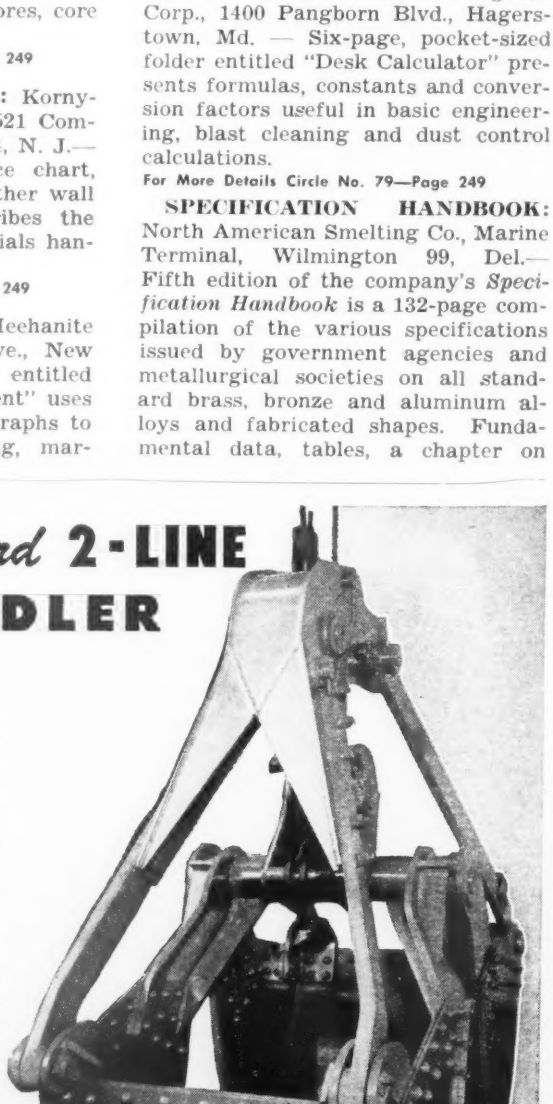

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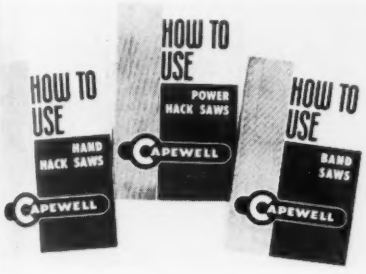
arc welding. It also contains charts giving selection data on electrodes, nozzles, argon cylinders, argon regulators and flow meters.

For More Details Circle No. 88—Page 249

MULTIPOINT RECORDER: Foxboro Co., Foxboro, Mass.—Technical information sheet TI 33-A-15a describes the various combinations of control and alarm available with an electronic multipoint recorder which, with the addition of simple electrical mechanisms, can be made to actuate alarm systems and to control process variables. Unit continuously records up to six temperature, flow or conductivity measurements on a single chart.

For More Details Circle No. 89—Page 249

SAWS: Capewell Mfg. Co., 60 Governor St., Hartford, Conn.—Three information booklets cover the selection and use of hand hack saw, pow-



er hack saw and band saw blades. Each is illustrated, and comprehensive charts and diagrams accompany the descriptive matter.

For More Details Circle No. 90—Page 249

MEMORANDUM BOOK: Supervisor's Memos & Quotes, 30 Clift St., Mystic, Conn.—Sheet describes pocket memorandum book for supervisory employees. Book is issued quarterly, has 64 pages, dirtproof acetate protector and other features.

For More Details Circle No. 91—Page 249

SAND HANDLING: Newago Engineering Co., Newago, Mich.—New monthly publication called *Sand Scripts* contains interesting comments on the foundry industry and matters pertinent to it. Part of the space is devoted to information about the company's sand handling unit.

For More Details Circle No. 92—Page 249

PLATFORM LIFT: Barrett-Cravens Mfg. Co., 4609 South Western Blvd., Chicago—Folder illustrates and explains the use of a platform lift truck with pushbutton controls that is designed for overhead maintenance work as high as 20 ft.

For More Details Circle No. 93—Page 249

WALL LOUVERS: Burt Mfg. Co., Dept. F, Akron 11, O.—Form SPV-17 covers the firm's complete line of wall louvers. Louver operators, screens and specifications are included.

For More Details Circle No. 94—Page 249

INDUCTION MOTORS: Lima Electric Motor Co., Dept. 112, Lima, O.—Bulletin RS-2 offers speed-torque curves, frame number charts and di-

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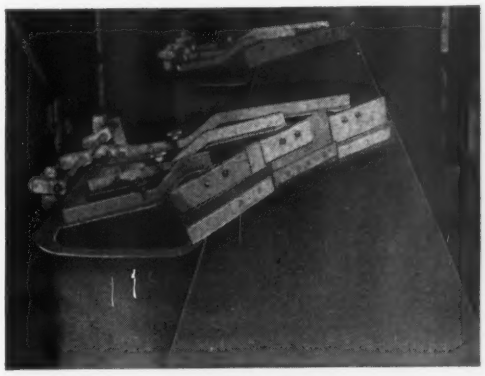

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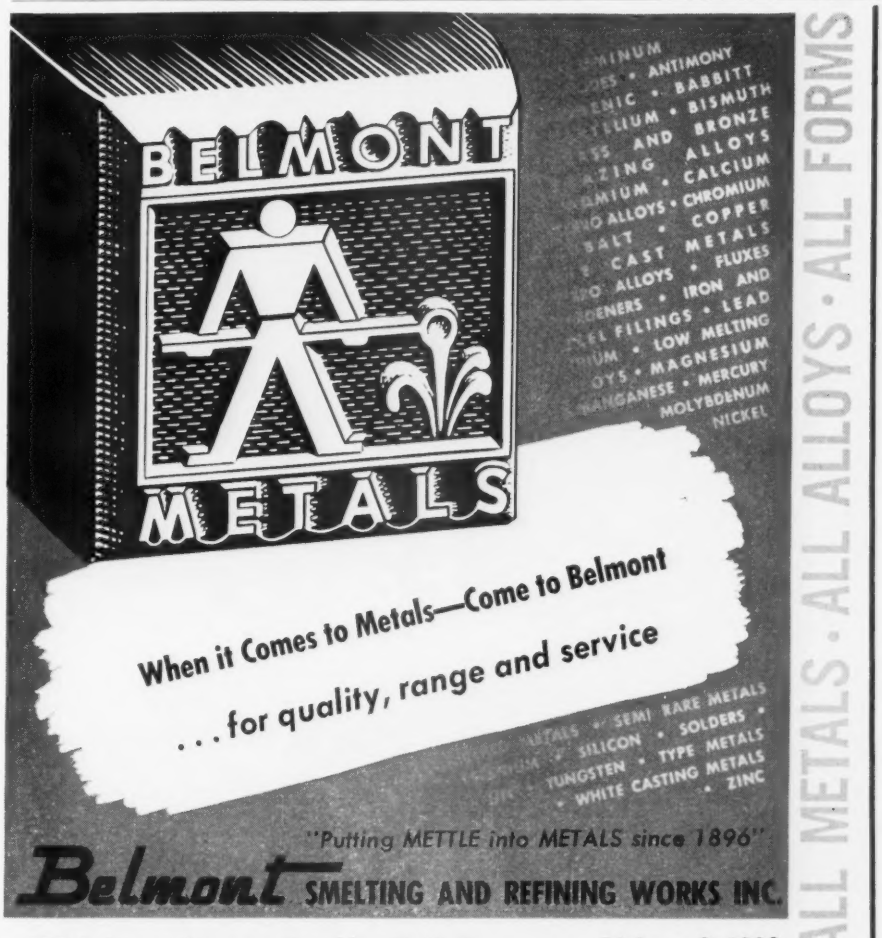
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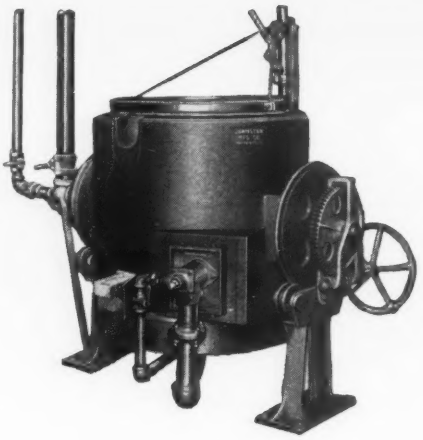

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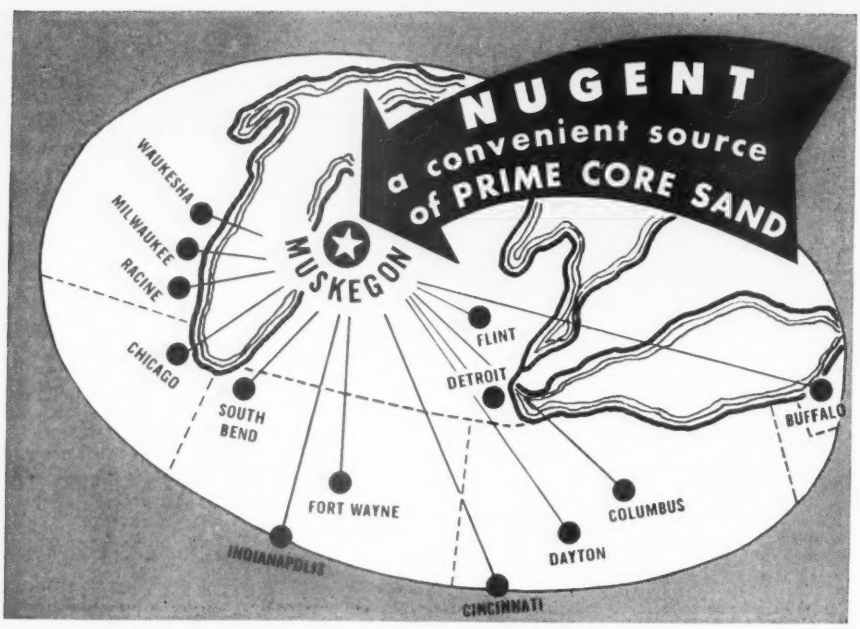

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mensions and specifications for induction motors of 1/3 to 150 hp. Recent changes in design and descriptions of variations for optional mounting and special purpose applications also are covered.
For More Details Circle No. 95—Page 249

MATERIALS HANDLING: Allied Mfg. & Sales Co., 201 North Wells St., Chicago 6—Catalog 53 covers "C" clamps and such materials handling equipment as two-wheel hydraulic lift hand trucks, fork lift stacker hand trucks, hydraulic material elevators, barrel and totepan dumpers, portable shop cranes, derricks and hoists. Catalog is letter file size and conveniently arranged with color coded tab separators for each equipment classification.
For More Details Circle No. 96—Page 249

ELECTROMAGNETS: Ohio Electric Mfg. Co., 5400 Dunham Rd., Cleveland—Booklet 112 is profusely illustrated with cutaway sections, photos and application shots of the company's lifting, separating and road sweeping magnets. It also gives magnet weights and lifting capacities for all company standard bolted, welded and basket type magnets.
For More Details Circle No. 97—Page 249

SOUND SIGNALS: Benjamin Electric Mfg. Co., Des Plaines, Ill.—Combination manual, data book and catalog of sound signals tells how to use sound signals to increase protection and production. Fundamental information on the subject, specifications of equipment, technical data and other materials are included.
For More Details Circle No. 98—Page 249

MEASURING INSTRUMENTS: Photovolt Corp., 95 Madison Ave., New York 16—General bulletin 100 contains brief descriptions of all photoelectric and electronic measuring instruments currently manufactured by the company, including a number of recently developed items.
For More Details Circle No. 99—Page 249

CUTTING TORCHES: New Era Engineering Co., Dept. B62, 458 West 29th St., Chicago 16—Bulletin 101 describes and illustrates the various types of guides made by the company for hand-held cutting torches. Prices and shipping weights are included.
For More Details Circle No. 100—Page 249

BIN LEVEL INDICATOR: Convair, Pittsburgh—Illustrated folder discusses the firm's new bin level indicator in terms of its features, operation, dimensions, prices and other pertinent facts.
For More Details Circle No. 101—Page 249

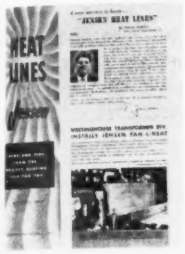
PRECAST CONCRETE: Marietta Concrete Corp., Marietta, O.—Illustrated brochure presents general information about precast concrete insulated sandwich wall panels for industrial construction.
For More Details Circle No. 102—Page 249

ROTARY FILES: R. G. Haskins Co., 2651 West Harrison St., Chicago 12—Bulletin 57 completely catalogs

the firm's line of rotary files, high-speed steel ground cutters and carbide tools, and makes recommendations about their selection and operating speeds.
For More Details Circle No. 103—Page 249

INDUSTRIAL CONTROLS: Minneapolis-Honeywell Regulator Co., Industrial Division, Wayne & Windrim Aves., Philadelphia 44—Catalog 8305 describes and illustrates nonindicating electric, electronic and pneumatic controllers for temperature, pressure and humidity and pneumatic and electric valves, switches and relays. Specifications, dimension drawings, application data and ordering information are included.
For More Details Circle No. 104—Page 249

PROCESS HEATING: Jensen Specialties Inc., 9331 Freeland Ave., Detroit 28 — Bimonthly publication of technical data and tips on process heating is designed to help men engaged in production planning and maintenance where process heating is a factor. Typical industrial oven installations at major manufacturing plants are featured in each issue. Special heating problems and their solutions are described and illustrated.



For More Details Circle No. 105—Page 249

CASTING IMPREGNATION: American Metaseal Mfg. Co., 30 East 60th St., New York 22—Bulletin covers development and application of the process of impregnating porous castings. Illustrations show the process and the equipment used in batch immersion. Tables give properties of the company's impregnant and data about corrosives it will resist.
For More Details Circle No. 106—Page 249

TEMPERATURE CONTROLLERS: Barber-Colman Co., Rockford, Ill.—Bulletin F 5783 presents information concerning the company's complete line of Model 200 Series temperature controllers for on-off proportioning and control in the solution of industrial heat control problems.
For More Details Circle No. 107—Page 249

VARIABLE SPEED DRIVE: Reeves Pulley Co., Columbus, Ind.—Bulletin V-532 describes a variable-speed drive with flexible mounting features and presents rating tables, shaft center distances, ordering instructions and complete dimensions.
For More Details Circle No. 108—Page 249

BELT CONVEYORS: Stephens-Adamson Mfg. Co., Aurora, Ill.—Bulletin 453 points out the construction features and operational advantages of belt conveyor carriers with spun end rolls and welded steel frames.
For More Details Circle No. 109—Page 249

MICROSCOPES: R. Y. Ferner Co., 110 Pleasant St. (Malden Station), Boston 48—Brochure describes and

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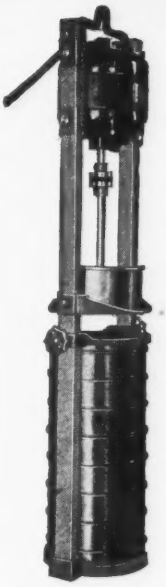

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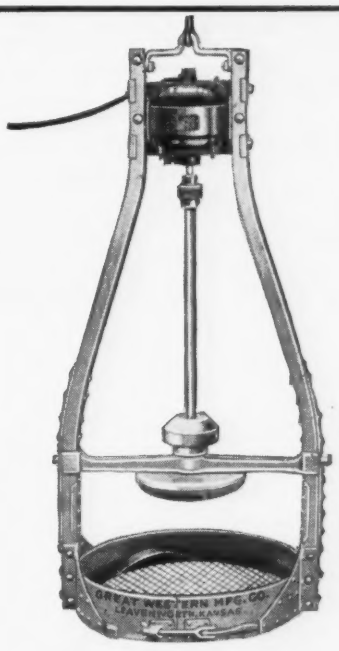

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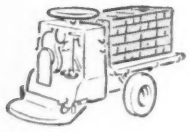

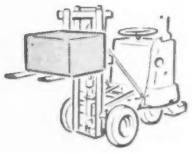

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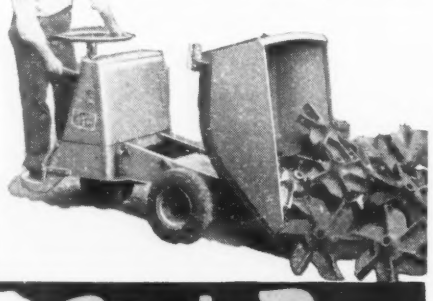

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illustrates some of the line of metallurgical microscopes manufactured by Cooke, Troughton & Simms Ltd., York, England, for whom Ferner Co. is the American agent.
For More Details Circle No. 110—Page 249

PYROMETERS: General Electric Co., Schenectady 5, N. Y.—Bulletin GEC-713B describes indicating and controlling pyrometers in terms of design features, applications, operation, functional principles, construction and specifications. It also offers information on thermocouple components and accessories, hand pyrometers, thermocouple potentiometers, resistance thermometers and industrial resistance bulbs.
For More Details Circle No. 111—Page 249

HEAT TREATING FURNACES: Despatch Oven Co., 619 Southeast Eighth St., Minneapolis—Bulletin 81 shows many designs of the organization's furnaces in operation on a variety of heat treating application. Furnace performance records, specifications for pot, batch and conveyor furnaces and other material are included.
For More Details Circle No. 112—Page 249

SILICON BRONZE: R. Lavin & Sons Inc., 3426 South Kedzie Ave. Chicago 23—In addition to data concerning deoxidizers, degasifiers and fluxes, volume 9, number 1 of *The Lavingot* contains "Silicon Bronze," an article by Ray Cochran, Lavin metallurgical engineer, who discusses the applications of silicon bronze.
For More Details Circle No. 113—Page 249

AIR VALVES: Lehigh Air Control Division, Lehigh Foundries Inc., Easton, Pa.—Folder illustrates and describes air-operated valves of various types, manufactured by the company. Features, dimensions, applications and other data are included.
For More Details Circle No. 114—Page 249

VARIABLE SPEED DRIVE: Reliance Electric & Engineering Co. 1088 Ivanhoe Rd., Cleveland 10—Bulletin D-2102 presents an illustrated description of a newly improved electronic, adjustable speed drive of from ¾ to 3 hp, designed for power-

JOE GENOVESE.

ing a wide range of small industrial equipment. Booklet includes complete engineering data.
For More Details Circle No. 115—Page 249

ABRASIVE - BELT GRINDING: Porter Cable Machine Co., 23 Exchange St., Syracuse, N. Y.—Booklet entitled "Wherever There's Industry" contains 46 case studies on abrasive-belt methods which effected savings on machining operations in a variety of industries. Over 100 illustrations are included.
For More Details Circle No. 116—Page 249

SCIENTIFIC APPARATUS: Burrell Corp., 2223 Fifth Ave., Pittsburgh 19—Bulletin 328 contains prices, descriptions and illustrations of the most frequently ordered items in the company's line of scientific apparatus and laboratory chemicals. It also lists other literature describing in detail the items shown in this publication.
For More Details Circle No. 117—Page 249

INDUCTION MELTING: Russ-Electric Furnace Co., Room 759-760, 1775 Broadway, New York 19—Brochure presents features and specifications of German-made, small, low-frequency induction melting furnaces especially designed for sand, permanent mold and die casting foundries.
For More Details Circle No. 118—Page 249

WORK GLOVES: Edmont Mfg. Co., Coshocton, O.—Form 12 illustrates and describes work gloves coated with a reinforced plastic compound said to offer long wear and good gripping qualities when wet. Natural rubber-coated gloves also are described.
For More Details Circle No. 119—Page 249

PIPE LINE FILTERS: Dollinger Corp., 11 Centre Park, Rochester 3, N. Y.—Bulletin 210 includes specifications, engineering and performance data on low-pressure pipe line filter models for the removal of dust, dirt, pipe scale and other matter from compressed air lines.
For More Details Circle No. 120—Page 249

INSTRUMENTS: W. C. Dillon & Co., 14620 Keswick St., Van Nuys, Calif.—Bulletin PG-2 and 3 concern, respectively, mechanical pressure gages and stainless steel thermometers. Each contains illustrations, discussions of engineering features of the equipment and price schedules.
For More Details Circle No. 121—Page 249

INDUSTRIAL TRUCKS: Mercury Mfg. Co., 4044 South Halsted St., Chicago 9 — Specifications and design and construction features of the company's new 4000-lb capacity sit-down truck are illustrated and discussed in bulletin 430.
For More Details Circle No. 122—Page 249

MATERIALS HANDLING: Smith Devices Inc., 331 North Fourth St., Philadelphia—Bulletins 300 and 400 show clamps for lifting plate horizontally and vertically, and also describe other industrial material handling devices.
For More Details Circle No. 123—Page 249

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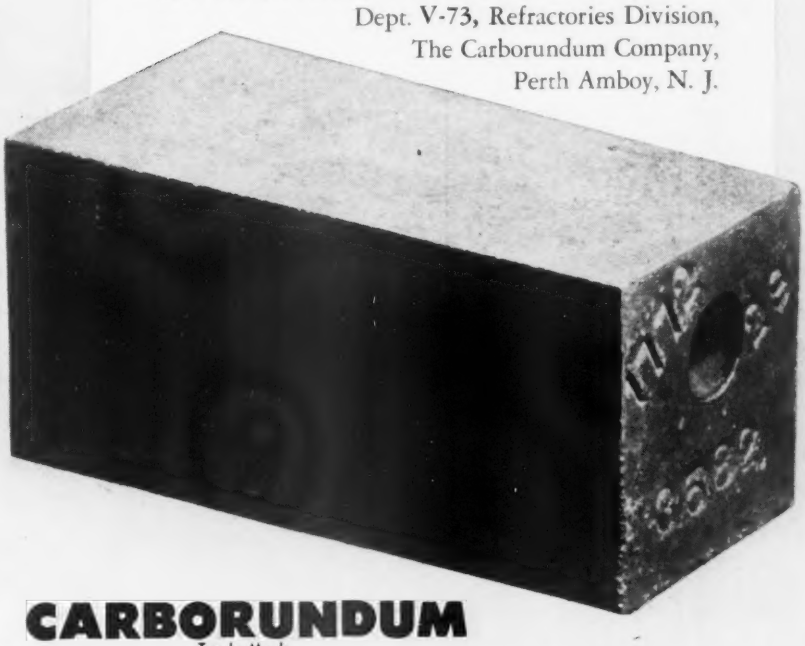

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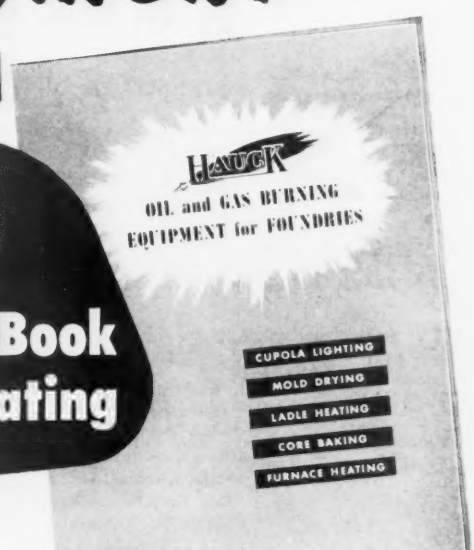

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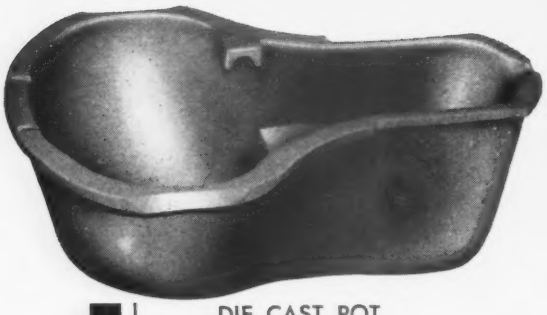

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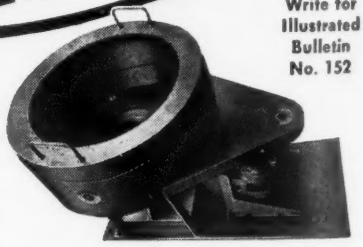

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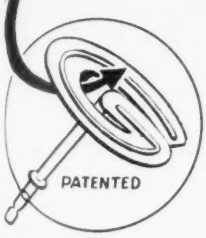

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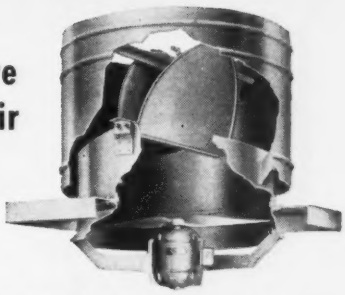

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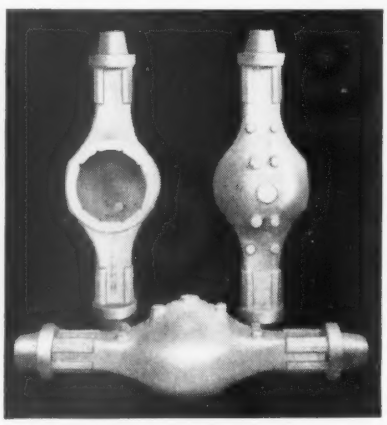

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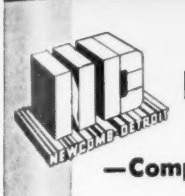

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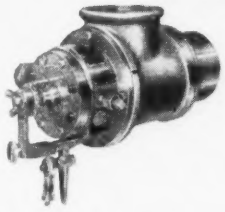

Proportioning Oil Burner for manual or automatic operation—Catalog No. 410.

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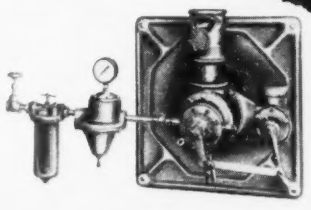

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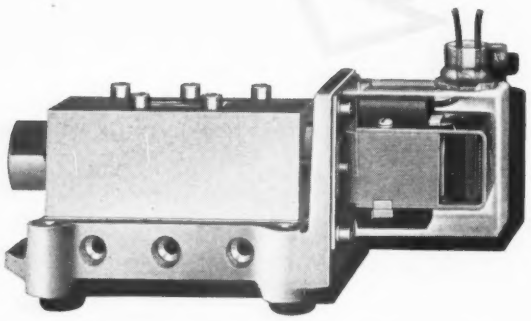

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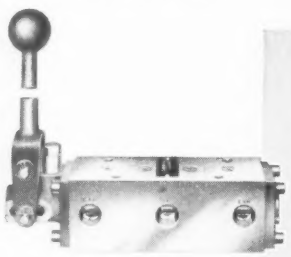

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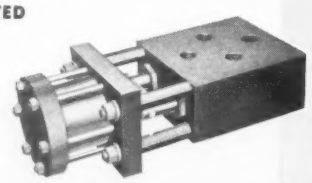

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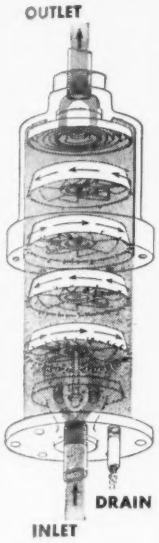

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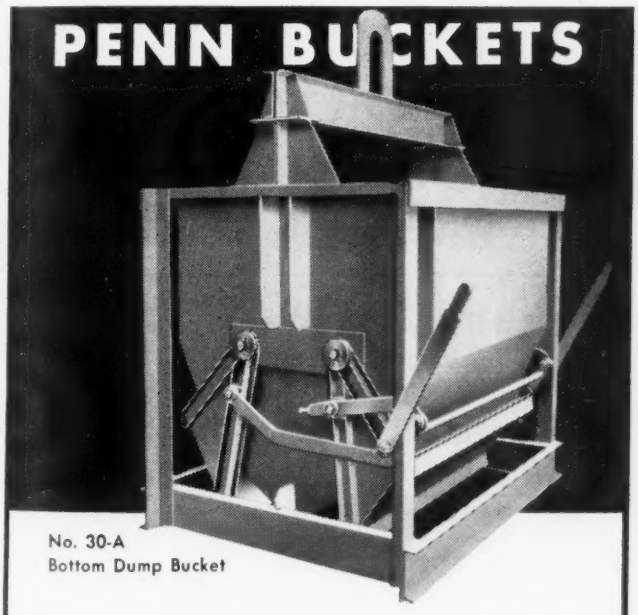

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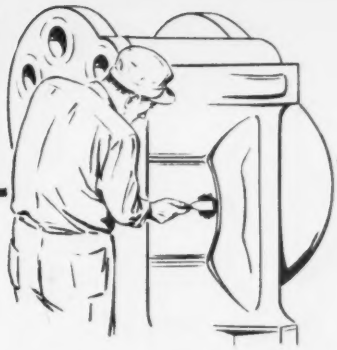

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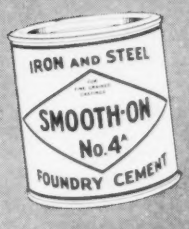

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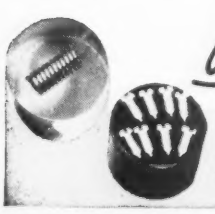

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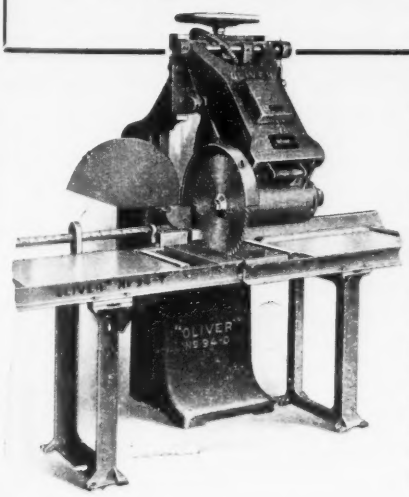
"OLIVER" Straightline Cut-Off Saw



In every way it's ideal for pattern shops

The "Oliver" Cut-Off Saw gives you accurate straight-line operation —insured by the suspended link motion. Makes straight cuts with saw, or cut-off wheel for metals. Saw returns to original locked position automatically with no rebound. Precision-built with ball bearings for smooth operation and low maintenance costs. *Write for Bulletin 94-D.*

- Operates by light touch
- Saves space
- Accurate to .005-inch

OLIVER MACHINERY COMPANY

Established 1890 GRAND RAPIDS 2, MICHIGAN

TM (DOWNTOWN TYPE) MAGNET CHAIN

MINIMUM WEAR. Special locating plate keeps legs at 120° centers — cuts friction, twisting and gouging.

RUGGED CONSTRUCTION. Ring and end link cannot be separated. Entire assembly is TM Alloy Steel.

Lasts 5 to 15 times longer — Assures twice the strength of wrought iron assemblies. Provides Increased Safety Factor. Means Lower Costs for You. Each Chain is Tested before Shipment.

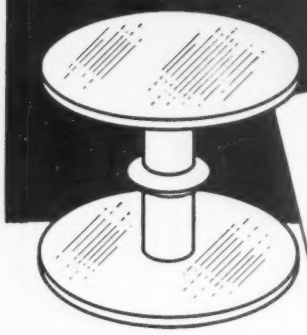
TAYLOR MADE A GREAT NAME IN Chain SINCE 1873

S. G. Taylor Chain Co.
Dept. 18, Hammond, Indiana
Rush literature and prices on TM Alloy Steel Downtown Magnet Chain.

Name_____

Address_____

no chance for leakage here



Buffalo CHAPLETS

Exclusive fin design of both Double and Single Head types assures positive fusion with molten metal. No recess in stem to weaken structure. Leakage problem is ruled out. Burns in more easily. Does not chill molten metal.

In addition, extensive variety of other types to meet your needs exactly. Since 1912, serving the nation's leading foundries. Trial samples without charge.

Complete information in Catalog No. 16

Manufactured by
Combined SUPPLY & EQUIPMENT CO., INC.
211 CHANDLER ST., BUFFALO 7, N. Y.

SHALCO SHELL MOLDING MACHINES

- Greater Precision
  Dimensional tolerance of .003 inches per inch can be maintained.
- Better Surface Finish
- Higher Productivity
- Fewer Rejects
- Reduced Remelts
- Less Clean-up
- Less Material Handling
- Reduced Space Requirements

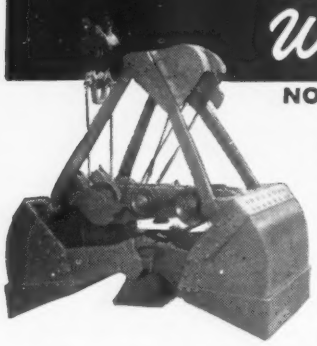
Call For Demonstration Appointment

ADAMS & NELSON CO.

4125 West Fullerton Ave., Chicago, Ill.

Albany 2-2767 Est. 1909

WELLMAN *Williams Type*



NO BUCKET-OPENING SHOCK ON CRANE HOOKS

The Wellman "Hook-on", single-line bucket provides you with clamshell bucket service at any crane hook where suitable head room and hoist capacity are available.

Both bucket and crane are protected against opening shock by a pair of adjustable snubbing sheaves. The snubbing action on the closing lines eliminates any shock when the bucket opens—an important feature since the operator cannot control opening speed of a single-line bucket.

Capacities from ⅜ to 2 cubic yards. Write for free bulletin.

THE WELLMAN ENGINEERING CO. 7019 CENTRAL AVE. CLEVELAND 4, OHIO

HAROLD E. PRIDMORE

P.O. BOX 137 PALO ALTO, CALIF.

Analyst for

MECHANICAL FOUNDRY PROBLEMS

EF

GAS, OIL AND ELECTRIC FURNACES

For all annealing and heat treating requirements

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Canadian Associates ● CANEFCO LTD. ● Toronto I, Canada

10 GRADES OF WASHED, DRIED, SCREENED

SILICA FOUNDRY SANDS

Produced from celebrated Ottawa District St. Peter Sandstone • Rounded Grains
Steel Molding Sand • Core Sand • Blast Sand • Furnace Bottom Sand
Opener Sand • Sand for Non-Ferrous, Aluminum, Magnesium Castings
MICROSIL Ground Silica (5 Grades of Uniform, Pure White Silica Flour)

MICROSIL GROUND SILICA

STANDARD SILICA CORPORATION

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DISTRIBUTORS IN ALL PRINCIPAL CITIES

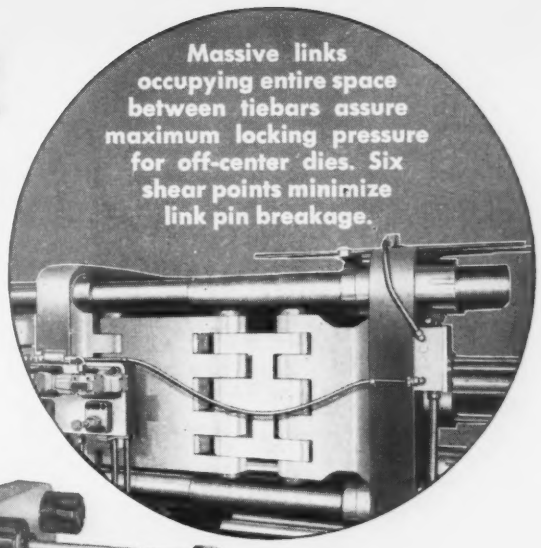
BLACKHAWK SILICA SAND

CAST - MASTER

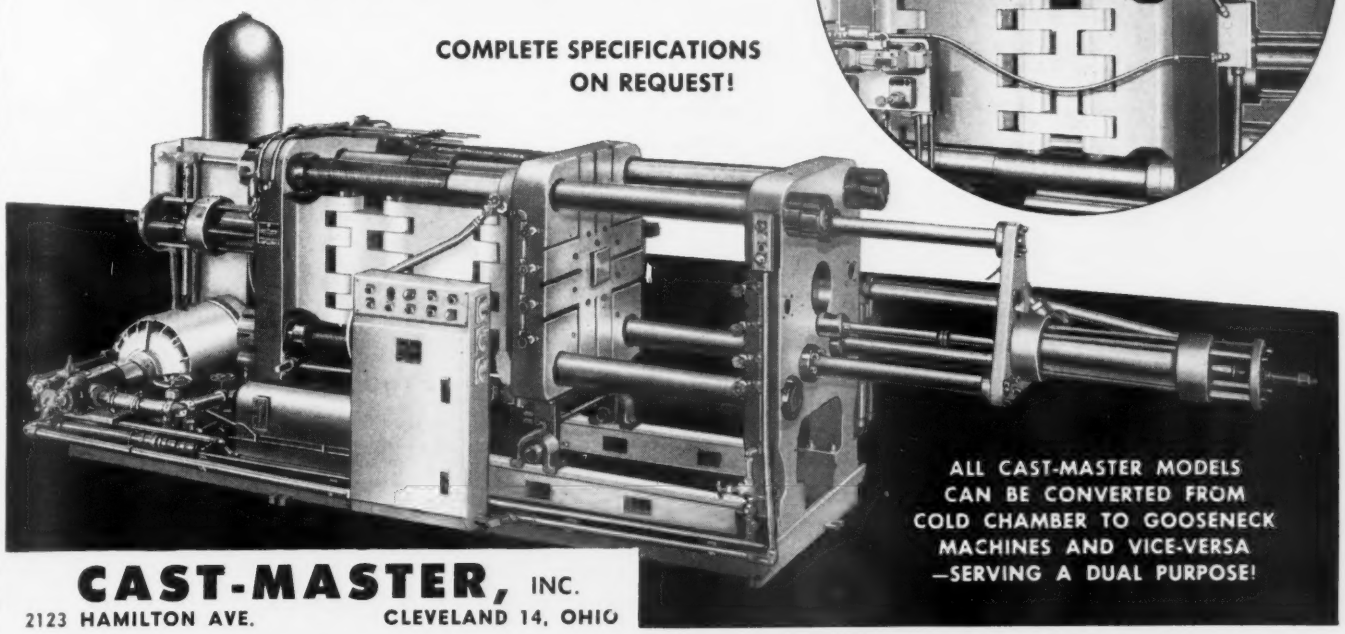
Die Casting Machines

STURDY, RIGID CONSTRUCTION ASSURES TOP EFFICIENCY, LOWER OPERATING COST!

COMPLETE SPECIFICATIONS ON REQUEST!



Massive links occupying entire space between tiebars assure maximum locking pressure for off-center dies. Six shear points minimize link pin breakage.



ALL CAST-MASTER MODELS CAN BE CONVERTED FROM COLD CHAMBER TO GOOSENECK MACHINES AND VICE-VERSA —SERVING A DUAL PURPOSE!

CAST-MASTER, INC.
2123 HAMILTON AVE. CLEVELAND 14, OHIO

TUMBLING BARRELS

Roller Bearing throughout
Direct Motor Drive with Speed Reducer
V Belt Motor Drive—Tight & Loose Pulley Drive

ROYERSFORD FOUNDRY & MACHINE CO.
BOX F
ROYERSFORD, PA.

PRODUCERS CORE SAND CORPORATION

PITS AT
MICHIGAN CITY, INDIANA
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"THAT GOOD" FOUNDRY COKE

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Phone 3-9135

HOW TO USE THE CUPOLA—*New 36 Page Handbook*

By BERNARD P. MULCAHY, President of Fuel Research Laboratories, Inc.

$1.00 Postpaid

"How To Use The Cupola" . . . 13 idea-packed chapters based on the practical experience of a man who has devoted his life to foundry fuel and melting problems.

It's a mighty useful handbook—a handy source of information which will pay for itself many times over in the months and years ahead.

Book Department, THE PENTON PUBLISHING CO., 1213 W. Third St., Cleveland 13, Ohio

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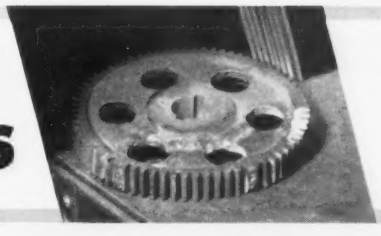
SALVAGE CASTINGS



with MARQUETTE NICOL-ROD No. 44

Cast or Malleable Iron
Machineable . . . without Preheating

Worth its weight in gold for repairing defective castings, castings sand pockets, machining errors, etc.

Marquette Manufacturing Co., Inc. 307 E. Hennepin Ave. Minneapolis 14, Minn.

The Herman Nelson line of UNIT BLOWERS offers industry the most diversified selection of packaged centrifugal fans available.

For a "BLOW-BY-BLOWER" description write to . . .

American Air Filter
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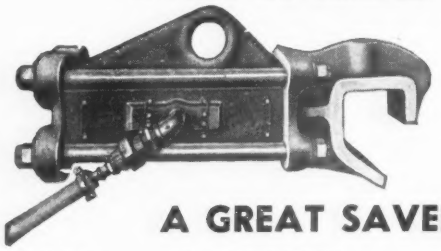
Producers of

FOUNDRY · METALLURGICAL
INDUSTRIAL COKE

"BRANFORD"
SHAKEOUT



A GREAT SAVER OF
TIME · LABOR · FLASKS

- Rugged, all steel construction to take the "gaff".
- Easy to install and economical to operate.
- Made in seven sizes, 2" to 8" piston diameter inclusive, capable of handling small pressed steel flasks up to large cast flasks.
- Jaw construction takes wide variation of flask flanges.

Send for questionnaire, fill in specifications and we will quote.

The BRANFORD Company
CONTINUING NEW HAVEN VIBRATOR COMPANY
130 CHESTNUT STREET, NEW HAVEN, CONN.

SERVING THE FOUNDRY INDUSTRY SINCE 1907
CRUCIBLES (all types)
RETORTS, GRAPHITE SHAPES
SUPER REFRACTORIES, FLUXES
BAY STATE CRUCIBLE CO. TAUNTON, MASS.
TEL. TAUNTON 4-5121

COST CONTROL
WESTOVER ENGINEERS
Westover ENGINEERS
FOUNDRY MANAGEMENT CONSULTANTS
3110 WEST FOND DU LAC AVE., MILWAUKEE 10, WIS.
There is no better time than NOW to review incentives, methods, scheduling, production control and paperwork processes.

FOUNDRY
EDWIN S. CARMAN, INC.
LEE ROAD AT MAYFIELD
CLEVELAND 18, OHIO
A COMPLETE FOUNDRY SERVICE
MODERNIZATION

CLASSIFIED ADVERTISING

Help Wanted

YOUNG MAN'S OPPORTUNITY
STEEL FOUNDRY

Opening leading to top supervision exists for young man already employed. Preferably he will hold an engineering degree. Have had two to five years actual foundry experience. Possibly as an assistant to a shop executive. Possibly quality control or metallurgy. Knowledge of sand problems very important. Knowledge of pattern rigging and estimating valuable.

Position open as number three man as member of top supervisory team upon your proof you can handle. Well rated company. Middle west location in non-metropolitan town. Growing improving business. Getting set to embrace more modern methods. Average starting salary offered. Will increase as you grow. Opportunity in our bonus system. Good fringe benefits. Living costs less than in metropolitan areas.

Inquiry confidential. No contact with your present employer until you say so. Personal interview at our expense to follow correspondence and phones. Please give complete home address and phone number.

BOX 713

FOUNDRY **CLEVELAND 13, OHIO**

EXPERIENCED BRASS FOUNDRY SUPERINTENDENT

To operate and supervise entire foundry operations of a jobbing manufacturer located in Northeastern Ohio. Castings ranging from 1 pound to 2500 pounds.
Must have technical knowledge and ability in all phases of brass foundry work.
The nature of the position, salary, stability, location, working conditions and company benefits make this an extremely attractive opportunity. Address replies in full confidence giving full information to:

BOX 691

FOUNDRY **CLEVELAND 13, OHIO**

FOUNDRY FOREMAN

Brass, bronze and aluminum castings. Location: Central East Coast. An old established nonferrous foundry of ten to twelve molders, in the jobbing field with a considerable part of its production in the more difficult alloys, is presently revamping its production control system and anticipates a change in personnel.
A man with technical or metallurgical knowledge and practical experience in foundry direction and training is required; not over 40 to 45 years of age is preferred.

BOX 645

FOUNDRY **CLEVELAND 13, OHIO**

SALES ENGINEER

Established company in East desires engineer familiar with sand practice to handle sales of furnace and reclaiming equipment to foundries throughout the country.

Please state qualifications and salary expected.

BOX 632

FOUNDRY **CLEVELAND 13, OHIO**

SUPERVISOR

Thoroughly experienced in high production mechanized jobbing foundry operation. Must have record of ability to handle men and thorough knowledge of modern equipment and methods. Established Eastern Foundry. State age, experience and salary. Address: Box 655, FOUNDRY, Cleveland 13, Ohio.

Help Wanted

FOUNDRYMAN

CAPABLE OF IMPROVING OPERATIONS AND QUALITY OF CASTINGS IN STEEL FOUNDRY. UNUSUAL OPPORTUNITY FOR AN AMBITIOUS MAN WITH GOOD SUPERVISORY CAPABILITIES IF HE CAN QUALIFY.
WE OPERATE A STEEL FOUNDRY, ELECTRIC PROCESS, ABOUT 350 TON MONTHLY, AND NEED A MAN TO SUPERVISE QUALITY CONTROL AND GENERAL IMPROVEMENT. LOCATED IN OHIO.
GIVE PARTICULARS OF EDUCATION, AGE, FAMILY STATUS, AND LATE PICTURE, IF AVAILABLE, IN FIRST LETTER. ALL CORRESPONDENCE WILL BE CONFIDENTIAL, AND QUALIFIED MEN WILL BE INTERVIEWED PERSONALLY.
IF INTERESTED, WRITE:

BOX 681

FOUNDRY **CLEVELAND 13, OHIO**

PATTERN SUPERVISOR

For key job modern production foundry.
Must be journeyman wood pattern maker, able to take charge of wood, metal, and foundry setup. Experience in automotive foundry work preferred. Must have knowledge of gating, core blowing, rigging, etc. Age 40 to 50.
Exceptional opportunity for right man.
Apply giving particulars including age, experience, references, how soon available, and salary expected.

BOX 698

FOUNDRY **CLEVELAND 13, OHIO**

STEEL FOUNDRY SUPERINTENDENT

For Midwest electric steel foundry producing approximately 175 tons of jobbing castings per month. Must have practical experience especially with loose pattern molding. Write full details of experience, personal information and salary expected. All replies confidential. Address: Box 670, FOUNDRY, Cleveland 13, Ohio.

CORE ROOM SUPERINTENDENT

For completely mechanized Eastern foundry. Experienced in all phases of core blowing, sand control and establishing production standards. State age, experience and salary requirement. Address: Box 649, FOUNDRY, Cleveland 13, Ohio.

METALLURGIST

Steel foundry, Midwest. Recent graduate. For shop investigations and sand control. Excellent opportunity with company organizing for the application of modern foundry technology. Write full details of education, experience and personal background. Address: Box 712, FOUNDRY, Cleveland 13, Ohio.

FOREMAN

Working foreman for foundry. Excellent opportunity in Northwest area. Should have experience in nonferrous metals. Permanent mold experience helpful. State all information in first letter. Address: Box 639, FOUNDRY, Cleveland 13, Ohio.

PATTERN SHOP FOREMAN

Experience in steel foundry practice desirable but not essential. In replying give complete information which will be held in strict confidence by a single executive. Address: Box 616, FOUNDRY, Cleveland 13, Ohio.

FOREMAN

To take charge of iron foundry located in New Jersey producing castings from one to fifteen hundred pounds each. In reply please state age, experience, and salary expected. Address: Box 694, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY TECHNOLOGIST

Preferably with some experience in cast iron. Should be prepared to travel. State salary required and full qualifications. Address: Box 705, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY METALLURGIST

With experience in cast iron foundry practice. Prepared to travel. State age, experience, and salary required. Address: Box 704, FOUNDRY, Cleveland 13, Ohio.

Help Wanted

GENERAL FOUNDRY FOREMAN

For a medium-sized central New England gray iron foundry now being mechanized.

State experience and salary expected.

All replies confidential.

BOX 711

FOUNDRY **CLEVELAND 13, OHIO**

FOUNDRY SUPERVISORY PERSONNEL

Qualified foreman for all operations in highly mechanized, established malleable foundry. Positions open immediately. Must be familiar with progressive foundry techniques. State qualifications. Located: Midwest.

BOX 701

FOUNDRY **CLEVELAND 13, OHIO**

GRADUATE METALLURGIST

Gray iron foundry located in Wisconsin, pouring 140 tons daily of high production automotive and agricultural type castings. Write, giving full details on personal background, experience, salary expected, etc.

BOX 714

FOUNDRY **CLEVELAND 13, OHIO**

METALLURGIST

Prefer man with iron or steel foundry experience in controlled analysis for position in modern alloy iron and small steel casting foundry. Cold melt and duplexing through electric arc and induction furnaces. Gating and risering experience beneficial. Fine opportunity for progressive man.

BOX 699

FOUNDRY **CLEVELAND 13, OHIO**

FOUNDRY SALES ENGINEER

Foundryman or metallurgist to demonstrate and sell foundry chemicals. Must be able to diagnose foundry problems. Age 21 to 35 preferred. Several territories open. Address: Box 703, FOUNDRY, Cleveland 13, Ohio.

SALES ENGINEER

Expanding company has attractive opening for reliable man capable of selling and servicing foundry accounts. Knowledge of foundry sands essential, foundry experience desirable. Midwest location. Address: Box 696, FOUNDRY, Cleveland 13, Ohio.

MANAGER

Small aluminum and bronze jobbing and production foundry located in central Ohio has attractive opening for aggressive manager to take complete charge. Must know all phases of molding; 45 years of age or less preferred. Address: Box 715, FOUNDRY, Cleveland 13, Ohio.

PRODUCTION MANAGER

Qualified foundry production manager in moderate sized gray iron foundry located in the East. State experience, age, and give references. Address: Box 692, FOUNDRY, Cleveland 13, Ohio.

OPEN HEARTH MELTER

Experienced in basic steel foundry practice. In replying give complete information which will be held in strict confidence by a single executive. Address: Box 615, FOUNDRY, Cleveland 13, Ohio.

MANAGER OR GENERAL SUPERINTENDENT

Magnesium, aluminum or bronze; practically all phases foundry, including melting, synthetic sands. Quality minded, production wise, executive, group leader, personnel relations, good organizer. Set up shop from beginning. Prefer New England or Eastern States. Middle aged, good health, excellent references. Address: Box 717, FOUNDRY, Cleveland 13, Ohio.

Help Wanted

SHOP FOREMAN

For nonferrous foundry located in middle west. Good opportunity for right man. Advise qualifications. Address: Box 710, FOUNDRY, Cleveland 13, Ohio.

INDUSTRIAL ENGINEER

List past experience and also state salary expected in first letter. Must be familiar with foundry work. Address: Box 707, FOUNDRY, Cleveland 13, Ohio.

Engineering Service

ENGINEERING SERVICES

Cost and scrap reduction trouble shooting, mechanization surveys, process engineering, estimating procedures, incentives, council on management and reorganization and sales.

CARL E. ROWE & COMPANY
INDUSTRIAL MART BUILDING
500 W. NATIONAL AVENUE
MILWAUKEE 4, WISCONSIN
PHONE: EVERGREEN 4-2733

Opportunity

SELLING ARRANGEMENT WANTED

With a reliable producer of nonferrous aircraft castings, by sales engineering office in New York City, established in 1937. For military aircraft and instrument accounts in New Jersey and Long Island. Foundry must have adequate laboratory controls, x-ray and spectro chemical inspection facilities to meet Navy and Airforce specifications. Address: Box 706, FOUNDRY, New York 17, New York.

Representatives Wanted

SALES REPRESENTATION

WANTED

Well established foundry engineering works wants thoroughly qualified representative. If possible, foundry expert with established customer relations. Send complete information including experience and references.

BOX 644

FOUNDRY **CLEVELAND 13, OHIO**

ELECTRONIC CORE BAKING EQUIPMENT

Leading manufacturer has territories to offer. Unusual opportunity available for qualified men who can sell. Write giving all qualifications.

BOX 695

FOUNDRY **CLEVELAND 13, OHIO**

SALESMAN WANTED

Steel casting firm desires salesman with background to sell carbon, low alloy and stainless castings on Eastern seaboard.
Firm now producing pressure castings. Has X-Ray equipment and complete facilities.
State qualifications in reply.

BOX 685

FOUNDRY **CLEVELAND 13, OHIO**

SALESMAN

High production nonferrous foundry, division of top rated company desires sales representation in New Jersey and Pennsylvania. Commission Basis. No objection to other lines. Replies held in confidence. Send details, age, experience, other lines handled, etc. Protected Territory. Address: Box 652, FOUNDRY, Cleveland 13, Ohio.

SALESMAN

Familiar with Midwestern foundries to sell and service a basic foundry material. Technical background helpful but not necessary. Write giving full details and reference. Address: Box 687, FOUNDRY, Cleveland 13, Ohio.

Representatives Wanted

CORE OIL SALESMEN

For State of Michigan and also Greater Philadelphia areas.
Excellent sales opportunity for two ambitious and technically qualified core oil salesmen with proven records of successful sales, to join a nationally known and outstandingly reliable core oil manufacturer, who is expanding direct sales coverage in Michigan and Eastern Pennsylvania areas. Both areas offer exceptional potential volume. Products are well known for uniformity and dependability and are backed up by close personal quality control of a nationally known foundry technician.
Men must be fully qualified in all phases of core room operations and experienced in large volume sales. Salary and commission basis. All replies strictly confidential. State full details, experience and other pertinent data.

BOX 673

FOUNDRY **CLEVELAND 13, OHIO**

Employment Service

EMPLOYMENT COUNSEL, INC.
"All The Name Implies"
JOHN COPE, Manager Foundry Dept.

Recruiting men for employers in the foundry industry throughout the nation. Openings in Steel, Malleable, Gray Iron and Non-Ferrous—Jobbing and Production. Salaries to $20,000.

PLANT MANAGERS	SUPERINTENDENTS
GENERAL FOREMEN	MOLD FOREMEN
CORE FOREMEN	MELTING FOREMEN
CLEANING FOREMEN	MAINTENANCE FOREMEN
PATTERN FOREMEN	METALLURGISTS
INDUSTRIAL ENGRS.	TIME STUDY ENGRS.

And all other Administrative and Sales Positions
WRITE or CALL for registration.
Completely Confidential.

SUITE 500 **7 WEST MADISON ST.,**
CHICAGO 2, ILLINOIS **FINANCIAL 6-2100**

SALARIED PERSONNEL

$3,000-$25,000. This reliable service, established 1927, conducts confidential negotiations for high grade men who seek a change of connection under conditions assuring if employed full protection to present position. Send name and address only for details. Personal consultation invited. Address: JIRA THAYER JENNINGS, 241 ORANGE STREET, NEW HAVEN 10, CONN.

Positions Wanted

PLANT ENGINEER
STEEL, ALLOY AND PRECISION CASTING

Graduate mechanical engineer. Extension work in electrical engineering. Supervising engineer, four plants of small unit, multiplant improvement, set up of new alloy steel fabrication and warehouse plant, operational completion engineering of new alloy precision casting plant. Experienced in installation and operation of industrial X-ray, equipment, mechanization and automation. Extensive application to dust collection, smoke and fume abatement. Experienced in foundation construction for, and setting of heavy industrial equipment and machine tools. Address: Box 690, FOUNDRY, Cleveland 13, Ohio.

SHELL MOLD AND INDUSTRIAL SALES EXPERIENCE

Industrial salesman with detailed technical background in shell mold. Have worked with pioneers in the field. Comprehensive patternmaking and foundry experience. Seeking sales position. For further information: Address: Box 684, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY EXECUTIVE

Gray iron, 28 years' experience in production and jobbing, 10 years as a manager of plants with daily tonnages as high as 125 ton, employing up to 300. Man of unquestionable character and excellent ability. Know foundry thoroughly. Address: Box 661, FOUNDRY, Cleveland 13, Ohio.

FOUNDRYMAN

Superintendent or general foreman, practical man, twenty-seven years in gray iron and nonferrous jobbing and production shops. Now employed. Prefer Western or Central New York. Address: Box 668, FOUNDRY, Cleveland 13, Ohio.

FOREMAN

Brass or bronze, experienced in French sand and false core molding, also skin dry molding and tablets. Twenty-eight years' experience in all phases of foundry operations. Address: Box 654, FOUNDRY, Cleveland 13, Ohio.

Positions Wanted

FOUNDRY MANAGER

Now established in foundry management consulting field. Experience strong in technical and supervisory functions with reputation for high production and low scrap. Achievements in technical and engineering phases are matter of record. Proven executive ability to develop and manage an organization with effective controls over quality, costs and profits. Under 45. Address: Box 677, FOUNDRY, Cleveland 13, Ohio.

EXECUTIVE

Experienced in all phases of foundry operations. Steel, iron nonferrous, plant and industrial engineering, cost control, accounting, industrial relations, machining administration. Address: Box 601, FOUNDRY, Cleveland 13, Ohio.

GRAY IRON FOUNDRYMAN

Available. Capable, qualified and experienced to direct all phases of foundry activities. Light to medium heavy work. Green and dry sand. Well versed in cupola operation and metallurgy. Fifteen years in present executive position. Middle aged. Good appearance. Pleasing personality. Address: Box 620, FOUNDRY, Cleveland 13, Ohio.

SUPERINTENDENT OR ASSISTANT

Fifteen years as supervisor in alloy steel. All phases of foundry work including melting, green and dry sand molding, core room, cleaning room, production planning. Excellent labor relations. Address: Box 689, FOUNDRY, Cleveland 13, Ohio.

GENERAL MANAGER

Mature, profit-minded, dependable. Has successfully managed four companies—two taken out of the red. Available for service shortly with medium-size company requiring reliable directing ability in management, sales finance and production. Excellent experience, foundry machine and related lines. Address: Box 622, FOUNDRY, Cleveland 13, Ohio.

MOLDER OR COREMAKER

Sixteen years' experience, desire job with chance of advancement. Green or dry sand, jobbing or production. Good references from several foundries. Thirty-four years old, available at any time. Address: Box 683, FOUNDRY, Cleveland 13, Ohio.

FOUNDRY METALLURGIST

B.S., Met. Eng. Six years' experience in gray iron, alloy iron, steel, cupola and electric furnace operation. Sand and permanent molds. Address: Box 718, FOUNDRY, Cleveland 13, Ohio.

Foundry Work Wanted

SMALL CASTINGS WANTED

Established buckle and findings firm desires working arrangement with foundry who will cast staple stock items. We will assemble plate and sell. 31 established sales agents in U. S. and export. References exchanged. Replies confidential.

BOX 686

FOUNDRY CLEVELAND 13, OHIO

WANTED

Heavy Floor Work
Gray Iron Castings
500 to 10,000 Pounds

Controlled metal with specifications to meet your requirements. Phone or wire collect.

THE J. B. EHRSAM & SONS MFG. CO.
ENTERPRISE, KANSAS

Foundries For Sale

FOUNDRY FOR SALE

For sale or rent, gray iron foundry North side of Chicago. Going concern capacity 800 tons per month. Equipped for heavy work up to 20,000 pounds.

Overhead travelling crane, number 6 Whiting cupola, 6 core ovens, large inventory of materials.

Goodwill and accounts also for sale. Established 30 years. For further details contact:

BOX 716

FOUNDRY CLEVELAND 13, OHIO

FOUNDRY FOR SALE

MODERN gray iron foundry producing castings up to 500 lbs. on machines. Capacity 12 tons per day. Land for expansion. Non-union shop with excellent personnel. Price $40,000, half cash.

EDWARD H. ZOLL
FOUNDRIES SOLD AND LEASED
790 BROAD STREET
NEWARK 2, NEW JERSEY

FOUNDRY FOR SALE

Gray iron foundry, small modern well established jobbing shop in Eastern Pennsylvania, fully equipped for small and medium castings. Four to five tons daily pouring capacity. Owner has other interests. Address: Box 651, FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Gray iron foundry in central Michigan specializing in boat anchors, City of Flint manhole castings, all kinds of furnace castings, State Roadside Park Grates, Board of Education boiler grates, and numerous other jobs. Orders guaranteed. Must sell because of ill health. Address: Box 669, FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Brick and steel foundry, Southern Illinois, 160 x 320 feet, overhead monorail water transportation available. Ideal for mechanized operation, contains equipment. Address: Box 702, FOUNDRY, Cleveland 13, Ohio.

Foundries For Sale

LOS ANGELES AREA

1. Aluminum, brass and bronze foundry, with heat treating plant. Profitable operation. Reasonable terms.
2. Gray iron foundry, modern, well equipped. Will sell or lease entire facilities. Long term lease.

CHARLES FORD & ASSOCIATES, INC.
6425 Hollywood Blvd. Los Angeles, Calif.
HO. 3-2331

SMALL FOUNDRY FOR SALE

On New York Central Railroad side track in Lockport, New York. Floor space of molders approximately 11,000 square feet with exceptional dumping ground for disposal of slag and waste indefinitely at lowest expense over declivity on the land. Considerable foundry equipment thrown in for the price of assessed value of the real estate. Address: JEFFERSON UNION COMPANY, LOCKPORT, NEW YORK.

FOR SALE

Foundry and machine shop in operation. Established trade over 20 years. Ample grounds, good buildings. Address: **T. I. RAGAN, 2202 E. OKLAHOMA PL., TULSA, OKLAHOMA.**

BRASS AND ALUMINUM FOUNDRY

Operating small production and jobbing foundry Western New York area. Completely equipped. Substantial order backlog. Real estate may be purchased or leased. Address: Box 693, FOUNDRY, Cleveland 13, Ohio.

Wanted-To-Buy

WANTED

Furnace Transformers

DELL STEPHENSON & COMPANY
14456 GLASTONBURY
DETROIT 23, MICHIGAN
TEL: VERMONT 5-0697

EQUIPMENT WANTED

Sand Slinger
Sand Preparator
#2 Simpson Mixer
Roller Conveyors
Belt Conveyors
Roll Over Pattern Draw Machine

BOX 709

FOUNDRY CLEVELAND 13, OHIO

MACHINERY WANTED

Induction Furnaces, Screens, Simpson Mixers, Riehle Compression Testing Machines, Pulverizers, Grinders, Conveyors. Address: **P.O. BOX 1351, CHURCH STREET STATION, NEW YORK 8, NEW YORK.**

MIXERS WANTED

Used Simpson Intensive Sand Mixers. State size, condition and lowest cash price or immediate acceptance. Address Box 578, FOUNDRY, Cleveland 13, Ohio.

WANTED

Large Midwestern manufacturer is interested in purchasing for cash one used Pittsburgh Lectromelt Furnace in good operating condition. Will consider any of the following models of this furnace: "RT", "R", "ST", or "S". Address: Box 708, FOUNDRY, Cleveland, 13, Ohio.

WANTED

No. 5 cupola and drop bottom charger. Have a General Blower, 10 HP, 1750 CFM, 16 oz. for sale at $150.00. Address: Box 171, Muskego, Wisconsin.

For Sale

FOR SALE

Pangborn Rotoblast Cleaning Machine, type 14LG5, serial #461, 14' diameter table with five auxiliary tables 5' diameter (removable), three rotoblast units, dust collector Pangborn type CH2, screen section, fan house, and KO7 exhauster (new in 1949). Motors and control for 440 volts, 3 phase, 60 cycles AC. Address: **THE BROWN FAYRO COMPANY, 940 ASH STREET, JOHNSTOWN, PENNSYLVANIA.**

FURNACES FOR SALE

Ten used heat treating furnaces and two seven ton gantry cranes. Good condition and available for immediate delivery. Address: **BAER STEEL PRODUCTS, INC. BOX 1428, BOISE, IDAHO.**

FOR SALE

MOLDING MACHINES
2—No. 275 Osborn jolt squeezers.
2—Deuscher Stationary jolt squeeze.
2—SPO #611B Stationary Oscillating Jolt Squeeze Strippers.
4—#610 Johnston & Jennings Air Jolt Rollover Draw Portable 24 x 30 table.
1—Tabor 36 x 50 table Air Jolt Rollover Draw, 3000# capacity.
2—International PKL 14"-5½" Jolt Squeeze Pin Lift.
1—Tabor Pedestal Core Rollover Hand Ram Rollover Draw 14 x 20 table 8" draw.
BLOWERS FOR CUPOLAS AND FURNACES
1—15 HP North American 2100 CFM at 16 ozs.
2—15 HP Spencer-Turbine 2250 CFM at 16 oz.
10—High temperature blowers 1400° F. 9000 to 15000 C.F.M.
2—#7½ Roots rotary blowers—27 x 81—14000 CFM.
1—Connersville rotary blower 22 x 66 45 cu. ft. per revolution 9000 CFM.
Maxon-Premix Blowers for Gas ¼ to 1 HP.
2—5 HP 20-oz. Spencer Turbine Blowers.
2—2 HP 20-oz. Spencer Turbine Blowers.
METAL MELTING EQUIPMENT
1—1000# open flame brass melting furnaces, gas fired.
1—Hausfeld Stationary Brass, Multiple gas burner, 200# cap.
1—Hausfeld Tilting crucible, gas, 250# Al Cap.
1—Hausfeld 2000# aluminum capacity furnace, barrel type, open flame, oil fired.
New 32" to 41" dia. shell cupolas made to order.
New 1000 lb. aluminum cap. tilting crucible furnaces to specifications.
MISCELLANEOUS
1—Beardsley & Piper Motive Sandslinger on rails, 19" head, 14' 6" swing, 3/60/220.
1—Simplicity Model B Sand Conditioning Unit, 4' x 8' double deck screens with aerator for piling.
1—Beardsley & Piper Screenarator, Model M, 3/60/220.
1—Stoney crane type shakeout.
1—Dings type M magnetic separator.
1—NC-4 sand separator.
1—#1 Demmler core blower.
2—#16 Roto-clone units complete.
1—McLeod Blast Tumbling Barrel, Size 36 x 36, Type S.
1—McLeod Small Sand Blast Barrel 24 x 24.
1—36W Wet Type Roto-Clone 34000 CFM.
1—24W Wet Type Roto-Clone 13000 CFM.
Complete stock of rebuilt mill and dust exhaust blowers.
1—27 x 36 American wheelabrator, tumblast with rubber belt.

CLIFTON MACHINERY COMPANY
1023 W. SIXTH ST. CINCINNATI 3, OHIO

FOR SALE
SAND BLAST EQUIPMENT

Wheelabrators-Tumblast size 48 x 42. $3000.00 to $4000.00.
Wheelabrator size 48 x 48. Like new. $5250.00.
Wheelabrator Tumblast 36 x 42. $4500.00.
Wheelabrator Table Blast 8'. $3000.00.
Pangborn Table Blast 10'. $3000.00
Sand Blast Cabinets, pressure tanks, dust collectors and blowers. All sizes.
Contact us for your sandblasting needs or any surplus sandblasting parts and equipment you have for sale.
Will accept your small machines as trade in on any of the above equipment.

DIAMOND SAND BLAST, INC.
5654 WEST JEFFERSON
DETROIT 9, MICHIGAN

FOR SALE

NEWAYGO UNITS (NEW 1952)
One Twin Overhead Hopper Handy Sandy with air operated hydraulic sand gates.
One Elevator Tower with Aerator.
One Feeder Hopper with conveyor belt to Elevator Tower. Feeder Hopper has power-driven screw conveyor for unloading conditioned sand without interrupting overhead hopper service.
One Reddy-Sandy Shakeout unit with moistener and aerator delivering conditioned sand to Feeder Hopper.

BUFFALO PATTERN WORKS, INC.
830 HERTEL AVENUE
BUFFALO 16, NEW YORK

FOR SALE

Model BG Simplicity Portable Shakeout, 3' x 5' deck size, 5,000 pound capacity, excellent condition. Complete with 7½ HP motor, 220 volt, attached ..... $700.00.

NEENAH FOUNDRY COMPANY
NEENAH, WISCONSIN

For Sale

FOR SALE

WHEELABRATORS

1—20 x 27 American Wheelabrator Serial Number A-48021 ..... $1750.00
1—27 x 36 American Wheelabrator Serial Number A-45922 ..... $2500.00

MOLDING MACHINES

8—#2047 Osborn Jolt Rollover Pattern Draw molding machines—1943..275.00 Each
5—Model 601-13 Osborn Jolt Rollover Pattern Draw molding machines..350.00 Each
1—#405 Osborn Jolt Rollover molding machine—79" table 1000.00
1—#413-3 Osborn Jolt Rollover Pattern Draw molding Machine; 130" x 42". 6500.00
1—SPO Model 914 Jolt Rollover Squeeze molding machine 250.00
2—International PKL Jolt Squeeze Strip molding machines; 12" cylinder—rebuilt ..... 375.00 Each
12—#275J Osborn Jolt Squeezers.. 125.00 Each

SANDSLINGERS

1—Beardsley & Piper Tractor Type Sandslinger with magnetic tower—13' arm 7500.00
1—#SS-30 Stationary Type Beardsley & Piper Speed Slinger with 22" head, 10'6" jib arm, 6' hydraulically controlled ramming unit 6500.00
1—Beardsley & Piper Motive Junior Sandslinger with 2 speed ramming motor, 19" head; hopper type; with magnetic separator 7500.00
1—Beardsley & Piper Stationary Sandslinger—16' arm; 19" head..... 2500.00

FURNACES

1—Stroman Aluminum Furnace — reverberatory type; 1200 lb. cap. gas fired; with skip hoist and hydraulic tilting equipment 3000.00
1—Lindberg aluminum furnace — 1500 lb. tilting type; complete with controls and blower 1500.00
One and two ton electric furnaces

CORE BLOWERS

1—Model 91 Osborn—Ser. No. 10786 D Small cores 750.00
2—Model 94 Osborn—Very large cores ..... 2500.00 Each
3—Model 193-4—Ser. Nos. 10842-A; 10745-B; 108420—cylinder draw type—medium cores ..... 1500.00 Each

SAND MIXERS

1—#404 Clearfield Mixer 1000.00
1—#30 Beardsley & Piper Speedmuller with loader 1500.00
1—#2 Simpson Mixer 3000.00
1—#610 Clearfield 2000.00

MISCELLANEOUS

2—Osborn Core Rollovers, Model 2042; power rollovers, hand draw..... 250.00 Each
1—Hough Payloader—Model HA..... 1000.00
1—Handy Sandy—complete unit with 4 hoppers & conveyor 3500.00
1—Hyster Fork Lift Truck; with pneumatic tires; 15,000 lbs. cap. 4500.00
1—Marschke Swing Frame Grinder—10 H.P. 650.00
1—Marschke Double End Grinder—7½ H.P. 275.00
1—Stromberg-Carlson 7-60 Relaydial P. X. Switchboard 1000.00
2—75 H.P. Ingersoll Rand Air Compressors ..... OFFER
3—Sly Master Blast Mills; 42" inside diameter x 36" deep ..... OFFER

BALCHER MACHINERY COMPANY
1884 S. COMPTON ROAD
CLEVELAND HEIGHTS 18, OHIO
PHONE: FAIRMONT 1-1186

FOR SALE

1—Milwaukee Jolt Rollover, Model No. 60-B-4, Serial No. 12471, Table size 30" x 60". Machine used only six months. Available for immediate delivery. Wire, Phone or Write:

SOUTHERN CAR & MFG. CO.
400—7th ST, SO. BIRMINGHAM, ALABAMA
TEL: 4-1714

FOR SALE

1—550 lb. capacity Reda Furnace. Can be seen in operation. Address: **POTTS FOUNDRY, INC., SHEBOYGAN, WISC., TEL. 4051.**

For Sale

FOR SALE
SHOT BLAST MACHINES

2—14 GK PANGBORN Rotoblast Barrels 1943 & 1947—One with Loader, Without Loader ..... $3750.
With Loader ..... 4500.
1—21 GK PANGBORN Rotoblast Barrel With Loader—Ex. Condition ..... $7750.
1—14'-0" PANGBORN Rotoblast Table 2 Wheels, Dust Collector ..... $7500.
1—AMERICAN WHEELABRATOR Tumblast, 20 x 27 Rubber Belt..... $1850.
1—#1 AMERICAN Tablast, Plain Table. $1750.
1—#1 AMERICAN Tablast, 18" Auxiliary Tables ..... $2000.
1—#1 AMERICAN Tablast, 12" Auxiliary Tables ..... $2500.

JOLT ROLLOVER MACHINES

1—3000# HERMAN ..... $3750.
1—607-E2 OSBORN, Real Bargain.
4—INTERNATIONAL TYPE G 20"....$450. ea.
3—14" x 8" INTERNATIONAL Type RJ ..... $275. ea.
1—401-1 OSBORN ..... $375.

JOLT STRIPPING MACHINES

1—1750# HERMAN ..... $975.
2—559 OSBORNS .....$1075. ea.

JOLT SQUEEZE MACHINES

11—275J OSBORNS.....$290. ea.
6—INTERNATIONAL Type LJS.....$240. ea.

JOLT SQUEEZE STRIP MACHINES

2—MILWAUKEE #193-4 .....$1550. ea.
3—INTERNATIONAL Type PKL .... 350. ea.

CORE BLOWERS

1—OSBORN #192 ..... $ 675.
1—CHAMPION #400 ..... $2750.

GRINDERS

1—10HP Double End HAMMOND ..... $650.
1—7½ HP U. S. Electric (new guarantee) $575.

AIR COMPRESSORS

1—40 HP GARDNER DENVER 1949.... $1975.
Rebuilt—New guarantee
2—20 HP CURTIS ..... $775.

THIS IS PARTIAL LISTING
IF YOU DON'T SEE WHAT YOU WANT,
CALL US COLLECT
LAND-WHITEHEAD EQUIPMENT CORP.
P.O. BOX 939 (PHONE 54379) READING, PA.

FOR SALE

One—Roots Positive Blower #7, capacity 11,500 cubic feet per minute at 1½ pounds, 195 R.P.M. Outlet 24" driven by Troy Type "ST" 14 x 12 vertical, throttling, self-oiling, enclosed steam engine. Engine new in 1947. Used very little.

THE NEW BRITAIN GAS LIGHT CO.
35 COURT STREET
NEW BRITAIN, CONNECTICUT

FOR SALE

SAND DRYER AND COOLER, Bartlett & Snow rotary, 54" cylinder, 12' length, complete.
2 APRON CONVEYORS, under storage hopper type, 36" wide, 13' centers. Complete with 7½ H.P. motors, Link Belt reducer.
Equipment practically new
Engineering change eliminates use.
ILLINOIS FOUNDRY COMPANY
SPRINGFIELD, ILLINOIS

TESTING MACHINES

1—Riehle 400,000# hydraulic and beam type Compression Testing Machine
1—Riehle 200,000# Universal
2—Riehle 100,000# Universal
1—T. Olson 100,000#
Also Simpson Sand Mixers 18" dia. Laboratory, #0, #1, #1½, #2, #3
Miscellaneous: Screens, Pulverizers, Grinders, Conveyors—all types, Tyler Rotap Screens, etc.
OUR 36th YEAR
CONSOLIDATED PRODUCTS CO., INC.
13-20 PARK ROW NEW YORK 38, N. Y.
TELEPHONE: BARCLAY 7-0600

FOR SALE

20 Haynes Squeezers, 12" squeeze cylinder, very good condition, $250.00 each; 1 Model C-36 Ringlift Sand Conditioner, excellent condition, $6,195.00; 1 Model M American Sand Cutter, good condition, $2,000.00; 1—4' x 6' model D Simplicity Shake Out, good condition, $1,950.00. Address: **BROOKS FOUNDRY, INC., 1712 JACKSON ROAD, ALBION, MICHIGAN, PHONE: 2167.**

FOUNDRY EQUIPMENT
MOLDING EQUIPMENT

Herman Jolt Rollover #6000, 40" x 60", 1947
2—Herman Jolt Stripper, 48" x 54", 1947
Osborn Jolt Roll Over, model 405S, with Roll out Car 44" x 48"
10—275 PJ Osborns—late type
10—SPO Squeezers 110J
29—2047-4 Osborns Jolt & Draw
1—558 Osborn Pin Lift
3—Haynes Squeezers
5—Milwaukee Squeezers
1—#331 Osborn Jolt Squeezer
2—Int'l. Portable 24 x 30 Rollover

MOLD HANDLING
& SHAKEOUT EQUIPMENT

Productive Shakeout 6 x 8
900 ft. 10" Logan Roller Conveyor 3½" dia
Jeffrey Powered Wood Slat Conveyor

SAND HANDLING EQUIPMENT

Unit A Syntron Feeder Hopper, 6' x 6'
2—Aerator, Overshot type, 9' x 2' & 4' x 3'
Aetna Sperser System
Simplicity Shaker, model C
Steel Hopper System
1—6' x 7' x 3'6"
1—12' x 7' x 3'6"
5—4'6" x 4'6" x 1'
Belt Conveyor Systems
Simplicity Gyrating Screen 2' x 3'
4—Green Sand Hoppers 4 yd. cap.

CRANES & HOISTS

15—Curtis Traveling Bridges, 15' span
16—Curtis Air Hoist, 5 & 6" Cylinders, 3½' x 4' Lifts

CUPOLA & LADLE EQUIPMENT

Roots-Connersville Blower, 14 x 36, 30 hp., late
Roots Connersville Blower, 22 x 66, 75 hp
#7½ Roots Connersville Blower 6300 cfm
Ingersoll-Rand Centrifugal Blower, 3000 cfm
North American Centrifugal Blower, 3000 cfm
Spencer Turbo Blowers, 2250 cfm @ 16 oz.
2850 @ 16 oz.
2—#9 Whiting Cupolas
Geared Ladles—1 ton to 4 ton—tilt.

MISC. FOUNDRY EQUPT.

15,000 ft. #458 Chain Conveyor
Brinell-Rockwell-Richie Testers
2—Int'l SB11 Core Blowers
Demmler #1 Core Blower
Despatch E3245 Core Oven, gas.
Porbeck C-3C drawer type Gas Core Oven
3—12 x 12 Pangborn Sand Blast Rooms, with Dust Collectors
Am. Wheelabrator Tablast #2, with (8) 24" Tables.
Am. Wheelabrator Tablast #1A, with (6) 26" Tables
2—Lindberg Fisher 225 lb. tilting Furnaces & Blowers
Baker Lift Truck, 6000# cap., 1948
Yale Lo Lift, red. power.
Logan Wood Slat Conveyor, motorized, 36" x 35' Roller Conveyor
15—Double End Grinders
#124 Gardner 53 Horiz. Grinder

Tons of Flasks 12 x 18 to 48 x 120
Core Blower, Champion, model CB400, 300 lb.
Roto-Clone units, 24W & 36W, with sludge ejectors
Vibrators, Osborn, 1⅝" x 2"
Welded Steel Pouring Crucibles, new, 1700#
Electrified Monorail
2—McLeod Tumbling Barrels
Bottom Dump, Sand Buggies
Exhaust Fans—to 60"
Fire Extinguishers—CO2
Exhaust Blowers—all sizes

WE WILL BUY—FROM 1 PIECE UP TO ENTIRE FOUNDRY

GREENE BROTHERS
(FORMERLY ASSOCIATED WITH ALLIED MATERIALS HANDLING CO.)
511 FREEMAN AVE.
CINCINNATI 3, OHIO

Please send me **FOUNDRY**

☐ For 1 Year, $5. ☐ For 2 Years, $8. ☐ New subscription. ☐ Renewal subscription.

AME: _____ TITLE: _____

OMPANY: _____

DDRESS: _____

TY: _____ ZONE: STATE: _____

oes your company operate a foundry? ☐ Yes. ☐ No.

FIRST CLAS
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CLEVELAND, OHI

BUSINESS REPLY CARD

No Postage Stamp Necessary if Mailed in the United States

—POSTAGE WILL BE PAID BY—

FOUNDRY

Penton Building

CLEVELAND 13, OHIO

FOR SALE

MOLDING MACHINES

1—Milwaukee Jolt Squeeze Machines, Model #123-13. Air operated by foot valves.
1—Johnson & Jennings Jolt Rollover and Pattern Draw, with automatic adjustable roll-out conveyor, Model #918-B, 20" draw, table size 44" x 54", air operated, serial numbers: 2518 and 2519. 1943 Machines. Used one year. LIKE NEW.
1—#332 Osborn Jolt, Squeeze, Rollover, Pattern Draw; Draw 9". Flask Size, 25" x 36".
1—Osborn #2047 Jolt Rollovers; 600 lbs. capacity, 8½" draw, Flask Size, 22" x 16" x 10⅛" deep, 1943 Machines.
1—Johnson & Jennings Jolt Squeeze Molding Machine, Serial Number 20873194.
1—Osborn #275-J Jolt Squeeze Molding Machines.
1—Champion Jolt Pin Lifts, Size 42-6.
1—International Jolt Pin Lift, Size 42-6.
1—#405 Osborn Rollover and Pattern Draw Molding Machine.
1—#2155 Spo Jolt Squeeze Pin Lift, 1948, LIKE NEW.

GRINDING EQUIPMENT

1—U. S. Electric Disc Grinder, Model 80, 7½ H.P. double end, serial 269638, 1942 machine.
1—Hammond 7½ H.P. double end Snagging Grinder, 220/440 volt, 3 phase, 60 cycle.
1—Besley Dry Grinder, Model #372, Circular Shape, size 53" Morton 20MT4 abrasive disc, serial #283442, Motorized, 20 H.P. Howell, 1943 Machine, used 1 year. LIKE NEW.
1—Fox Swing Grinders, Model #6, Wheel Size 20" x 2". 15 H.P. Motor, LIKE NEW.

SAND CONDITIONING EQUIPMENT

1—American Sand Cutter, size 69 x 45, Model AM, 1945 machine.
1—#2 Royer Sand Conditioner, Portable.
1—Model S Beardsley & Piper Screenerator, portable, pneumatic tires, serial #SS—2902-4710.
1—Jeffrey Portable Sand Conditioner, serial #377, type P, Class B Mixer.

FURNACES

1—Fisher Furnaces, Model MP gas fired, melting tilting type, motor operated, 2,000 lbs capacity.

CORE ROOM EQUIPMENT

1—Lanley Core Oven, 6' high, 3' deep, 7' wide, 4 door, 1950 machine. LIKE NEW.
1—Young (3) Compartment Pull Drawer Oven, FOR MAGNESIUM, each compartment 6'6" wide x 5'9" deep x 7' high inside, (3) drawers to compartment. Electric heating for temp. of 800°. 6" rock wool insulation, recirculation system for fan, complete with Micromax temp. controls and switches. Also, 5 H.P. 1800 R.P.M. motor, 440 V, 60 cy. 3 ph. AC. Fan cooled, with starter for same. FOR HEAT TREATING, DRAWING OR STRESS RELIEVING . . . LIKE NEW.
1—Coleman Core Oven, gas fired, 4 doors opening into single compartment, 42" wide, 50" high, and 31" deep, adjustable trays on 3" centers.
1—Coleman Core Oven, gas fired, 15' x 10' x 8' drawer type.
1—#91 Osborn Core Blower, Serial #10050-F.
6—#92—Osborn Core Blowers.
1—#3 Demmler Core Blower.
2—Redford Bench Type Core Blowers.

SAND BLASTING EQUIPMENT

1—American Wheelabrator Belt Type Tumblast 15" x 21" 1 cubic foot capacity, complete with dust collector elevator, serial #A 70074, 1946 machine, LIKE NEW.
1—Tumbling Barrel, 28" diameter, 40" long, equipped with 7 H.P. motor and speed reducer.
1—Pangborn Rotoblast Rocker Barrel Cleaning Machine, model #28, type GK-2 capacity 28 cubic feet per charge, with loader and electrical equipment.

SHAKEOUTS

1—Simplicity Shakeout 3' x 5', new in 1948.
2—Simplicity Shakeouts 3' x 3', new in 1948.
1—Simplicity Shakeout 4' x 6' Model D, 16,000 lbs. capacity, 10 H.P. motor.
1—Robbins Shakeout 4' x 10', 7½ H.P. Motor.
1—Simplicity Shakeout, 4' x 8'.

LIFT TRUCKS AND AIR HOISTS

2—Baker Raulangs Electric Fork Lift Trucks, 4,000 lbs. capacity, 119" lift, 1945 models. Used 1 month. LIKE NEW.
1—Yale & Towne Platform Jitney, electric, gasoline generating, 6,000 lbs. capacity, with model 1-36 Ready Power Unit, serial #5516.
3—Ingersoll Rand Air Hoists, size D, 4,000 lbs. capacity complete with low overhead trolley.
2—Ingersoll Rand Air Hoists, Size E, 10,000 lbs. capacity complete with low overhead trolley.
1—Ingersoll Rand Air Hoist, 2,000 lbs. capacity, not low headroom.
1—Little Giant Air Hoist, Model A, 1000 lbs. capacity.
1—Shaw Box Load Lifter Electric Hoist, 4,000 lbs. capacity, 440 V., 3 PH., 50 Cy., NEVER USED, LIKE NEW.
2—Yale & Towne Electric Hoists, 2,000 lbs. capacity, Heavy Duty, 220 V., 3 Ph., 60 Cy., Completely rebuilt, 1 with power trolley.
1—Tramrail Electric Hoist, 1000 lbs. capacity, complete with trolley, 220 V., 3 Ph., 60 Cy.
1—Ingersoll Rand Air Winch for pulling railroad cars.
2—Ingersoll Rand Air Hoists, Size B, 2,000 lb. capacity.

MISCELLANEOUS FOUNDRY EQUIPMENT

1—12' Powerized Belt Conveyor, 24" belt.
1—80', 24" Above Rail Roller Conveyor, 1½" Rollers, 8" Centers, 10' Sections.
1—Climax Wire Straightener, 1/16" to ¼" Capacity with 3 H.P. Lima Drive.
1—Riehle Tester, 100,000 lbs. Screw Type.
1—Riehle Tester, 150,000 lbs. Screw Type.
2—Vaporfiers #5, Serial #320 and 321.
1—G. E. Battery Charger, M.G. Set, Like New.
1500 FT. 20" AND 24" ABOVE RAIL CONVEYOR, 2½" ROLLERS ON 4' AND 5' CENTERS. HEAVY DUTY, EXCELLENT CONDITION.

VARIOUS SIZES STEEL FLASKS, HINES POP-OFF FLASKS, AND FREMONT FLASKS AND JACKETS.

A. A. A. MACHINERY & EQUIPMENT CO.
856 EDDY ROAD CLEVELAND 8, OHIO
PHONE: LIBERTY 1-6545

FOR SALE

TURBO BLOWERS WITH MOTORS

CFM	PRESS.	MAKE	CFM	PRESS.	MAKE
4750	24 oz.	Spencer	660	20 oz	A-B
4500	16 oz.	G.E.	500	10 oz.	No.Am.
3500	40 oz.	Spencer	400	4.3 oz.	Spencer
2800	1 oz.	Spencer	340	20 oz.	A-B
2700	16 oz.	No.Am.	320	12 oz.	Spencer
2700	16 oz.	Spencer	225	16 oz.	Spencer
2500	7 oz.	Sturt.	180	15 oz.	Spencer
2000	2½ oz.	Spencer	9100	7" SP	Sturt.
2000	1 oz.	Spencer	1100	4½" SP	Bayley
1150	20 oz.	No.Am.	100	7" SP	Spencer
800	8 oz.	No.Am.			

THE MOTOR REPAIR & MFG. CO.
1552 HAMILTON AVE.
CLEVELAND 14, OHIO

FOR SALE

DREVER SALT BATH FURNACE

Bath Size 12' x 4' x 7' depth Radiant Tube Gas Fired Complete with North American Blower and Leeds & Northrup Automatic Recording Temperature Control. Maximum Operating Temperature 1250° F.

Suitable for Salt Desanding or Stainless Cleaning.

CARDINAL STEEL SUPPLY
2695 E. 79TH
CLEVELAND 4, OHIO

HAVE YOU EVER NOTICED the numerous types of headings under which classified ads are listed? Whether interested in obtaining qualified personnel, selling used machinery, wanting to buy equipment, or are yourself looking for a better position, you should seriously consider advertising in the classified section of FOUNDRY MAGAZINE.

•

FOUNDRY has 45,000 readers which cover the entire foundry industry. That means that for a nominal sum you get the widest possible coverage of the industry and your advertisement reaches "just the right people".

•

The Classified Staff is equipped to handle all details in the placement of your ad.

Classified
ADVERTISING DEPT.
FOUNDRY
CLEVELAND 13, OHIO

For Sale

FOR SALE

1—No. 341 Denver Fire Clay tilting, crucible type, gas fired, melting furnace (2100 degrees F.) and 1½ HP, 220 volts, 3 phase 60 cycle blower, and 4 No. 40 graphite crucibles. Used for 2 melts only. Cost F.O.B. Denver—$827.00, F.O.B. Phoenix—$887.00.
2000 lbs. Federated Herculoy silicon gear bronze ingots.

C. J. WHITE & CO.
604 SOUTH 8th STREET ROGERS, ARKANSAS

FOR SALE

Motors, Generators, Transformers from 1 HP to 2500 HP
World headquarters for T.E.F.C. and explosion proof motors.
World's largest inventory.

ELECTRIC EQUIPMENT CO.
ROCHESTER, N. Y.

CRANE

Austin-Western crawler type crane with 30 foot boom, motor generator set and ½ yard clamshell bucket. Purchased new 1949. Can be inspected in operation.

SIBLEY MACHINE AND FOUNDRY CORP.
SOUTH BEND, INDIANA

FOR SALE

American Sandcutter, Model AM, Size 69/45, Serial #205; 220/440 Volt; in excellent working condition. Machine available immediately, complete with 70 ft. of cable and two outlet receptacles. Address all inquiries to: **KEUTHAN FOUNDRY DIVISION, THE BLACK-CLAWSON COMPANY, MIDDLETOWN, OHIO. PHONE: 2-8861.**

FOR SALE

Centrifugal Pipe Casting Machine. Licensed by Herman Pneumatic Machine Company. Address: **CHESANING PIPE COMPANY, CHESANING, MICHIGAN.**

For Sale

PRICED RIGHT FOR QUICK SALE

BUSCH SPRUE CUTTER, heavy duty for steel, 8" throat, capacity 1¾" square, 2½" round, equipped with 7½ HP, AC motor.
INTERNATIONAL CORE BLOWER #SB11, 15" x 24" Table.
MILWAUKEE ELECTRIC HOIST 1 ton capacity, 2 motors, motorized trolley, 10' lift.

GLOBE MACHINERY CO.
602 W. LAKE STREET, CHICAGO 6, ILLINOIS
ANDOVER 3-4185

FOR SALE

1—Moulder's Friend Sand Cutter, purchased new May, 1951 and used until September, 1952. Reason for selling—changed method. Serial #148, 60" wide, includes spare brush and parts $1,000.00
2—Haynes Portable Jolt Squeeze Molding Machines ..... $100.00 ea.
4—#R-7 Rapid Jolt Squeeze Molding Machines, inverted to portable machines..... $60.00 ea.

TIOGA FOUNDRY CORPORATION
OWEGO, NEW YORK

FOR SALE

1—Modern 3000# Mixing Ladle. Like New—Never Used.

THE WADSWORTH FOUNDRY CO.
WADSWORTH, OHIO

FOR SALE

Motive Speedslinger, new last December. 14' Arm, 7'6" ramming unit complete with 400 cubic foot tank, all motors, starters, collector trolley and operating switches. Located Pacific Coast port. Immediate shipment. Address: Box 688, FOUNDRY, Cleveland 13, Ohio.

FOR SALE

Core Sand Mixer, Baker-Perkins size 16½, type DIM "Unidor", 30 HP motor drive. Excellent condition. Yours for one-third of cost. Address: Box 697, FOUNDRY, Cleveland 13, Ohio.

FOR SALE

1—Mechanized Sand System—32 Molders Stations
1—Distributing Unit for 16 Molders. 110' C. C. Distributing Belt.

MELTING EQUIPMENT

1—#3½ WHITING Cupola and Charger, Blower, Mixing Ladle, Foxboro Control. New 1951.
1—#48 Newton Cupola. 1—#4 Whiting Cupola.

LADLES

2—"U" Type Modern Reservoir 3000# Ladles
1000# Cylindrical Ladles. 500# Covered Ladles.

BLOWERS

3—Spencer Turbo Blowers, 40 HP, 3600 CFM, 24 ounces.
4—General Turbo Blowers, 3 HP, 375 CFM, 16 ounces.

MOLDING MACHINES

SPO #110J—Jolt Squeezer Molding Machines.
Osborn #712 Jolt Squeezer Stripper Molding Machines.
Osborn 275J Jolt Squeezer Molding Machines.
Johnston & Jennings #918 Jolt Rollover Pattern Draw.
Herman—40 x 50"—40 x 60" Jolt Rollover Pattern Draw.
Davenport #28-A Jolt Rollover Pattern Draw.
International #1212-AN Rollover Draw Molding Machines.
International L. P. 16 x 8" Pin Stripper.

CORE OVENS

1—2 Compartment Foundry Equipment. Gas Fired.
1—Young Bros. Drawer Type Oven, Gas fired.

MISCELLANEOUS

3—Large Dravo Heating Units.
1—Simplicity Sand Blender, Model "C", 24 x 3".
3—American Sand Cutters.
Steel and Aluminum Flasks, Core Plates.
Largest stock of USED FOUNDRY EQUIPMENT in the U. S. Sold on Money Back Guarantee.

UNIVERSAL MACH. & EQUIPMENT CO.
320 EAST BROAD STREET
SHILLINGTON, PENNA.

PHONE READING 3-0311, 4-0146, 3-1021.
R. B. HARRISON, FDRY. MGR.
J. P. IRWIN, FDRY. ENGINEER

FOR SALE

Molding Machines

1—Link-Belt Roller Type Mold Conveyor complete with 35 cars 38" x 72"
3—#2166 Spo Jolt Squeeze Pin Lift
4—#814-P Osborn Jolt Squeeze Pin Lift
1—6000# Herman Rollover, Jolt and Pattern Draw 42" x 90"
2—#405 Osborn Jolt Rollovers & Pattern Draw—Like New
5—#601-13 Osborn Jolt Rollover and Pattern Draw
4—#2047-4 Osborn Jolt Rollover and Pattern Draw for cylinder head core production
2—22" x 42" Tabor Jolt Rollover and Pattern Draw, 600# 10" draw
2—SA-34 Davenport Jolt Rollover and Pattern Draw, 2500# jolt cap., 15" draw, 34" x 48" table, flask 36" x 64"
1—SA-28 Davenport Jolt Rollover and Pattern Draw, 1500# jolt cap., 12" draw, table 30" x 40"
5—Champion Draw Power Pushoff Machines 10" draw, 38" x 40" table
3—International Type JFL Jolt Ram, Foot-lever Pin Lift.
3—International Type R Hand Rollover
2—#815 J & J Jolt Rollovers & Pattern Draw

Core Room Equipment

1—#1 Demmler Core Blower
1—#3E Demmler Core Blower
6—#92 Osborn Core Blower
1—Redford Bench Core Blower
1—20" Paddle type sand mixer
1—#3 Simpson Muller
2—#2 Simpson Mullers
2—#70 Beardsley-Piper Mullers
1—Revolving Core Conveyor Table
1—Link-Belt Core Breaker Drum approx. 6' x 10'
Various sizes transite core plates

Cleaning and Grinding

2—Fin Cleaning Machines for cleaning cylinder heads
1—Universal Swing Grinder, 7½ H.P. 220/440-3/60
1—#30 Gardner Double End Disc Grinder
1—3 H.P. double stand grinder—flat belt drive 220/440/-3/60
1—10 H.P. double stand grinder — direct connected 220/440/3/60
3—7½ H.P. double stand grinders—direct connected 220/440/3/60
16—Cleaning Cabinets for Magnesium

Misc. Foundry Equipment

1—Pug Mill—Link Belt 42" x 96"
1—Atlas Car & Mfg. Co. Car Scale
2—Charging Cranes for cupolas, Shepard 3 ton cap. D.C. Cab operated. Complete with monorail.
Pouring ladles Whiting and Modern 1800 lbs. capacity.
1—4' x 10' Robbins Shake-out with 7½ H.P. motor 220/440/3/60.
1—4' x 6' Simplicity Shake-out, Model D, 1600# cap. 10 H.P. 220/3/60.
1—500# Hausfeld hand tilt furnace
3—Stationary Sand Slingers—Beardsley-Piper 16" head
2—#3 Jeffrey Vibrators
4—#4 Jeffrey Vibrators
1—50 H.P. Spencer Turbine Cupola Blower 16 oz. 220/440/3/60.
1—20 H.P. North American Turbine Blower 24 oz. 220/440/3/60.
2—3 H.P. Blowers for furnaces 16 oz. 220/440/3/60.
1—Pig Mold Conveyor (Link-Belt) 74' lg. complete with drive for aluminum and magnesium.
2—1000 Gals. p. min. Centrifugal Pumps, Ingersoll-Rand, 52 ft. head, 5" suction, 4" discharge, dir. connected to 20 H.P. 220/440/3/60, Rebuilt.
1—6500 lb. Toledo Floor Scale
1—Fully Equipped Impregnating Room
Various sizes steel flasks, Hines Popoff flasks and jackets.

EUCLID FOUNDRY & MACHINE EQUIPMENT CO.

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FOR SALE

AIR COMPRESSOR
Ingersoll Rand Type 10—14 x 9 x 12, 2 stage, 75 HP, 3/60/220/1200 rpm motor, 350 CFM at 100#.

BLOWERS
Spencer Turbo Blower 2250 CFM @ 16 oz., 15 HP, 220/440 V motor. New 1946.

CORE BLOWER
Hemmler #3E Dropaway Draw, New 1946.

CRANES
5 Ton P & H Overhead Elec. Traveling Crane, 30'6" span, 15' lift (can be increased) 3 motor, 220 V A.C. New 1946.
5 Ton P & H Overhead Electric 20'5" span, electric hoist, hand travel both ways, P/B control 440 V A.C.
10 Ton P & H Overhead Elec. Traveling Crane, double girder, fish belly, 3 motors, 230 V D.C., 54'7½" wide C to C of wheels can be cut down to fit smaller size.

CRUSHERS—PULVERIZERS
Stedman 15" x 12" Type A, 10 HP 3/60/220-440 V motor.

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U. S. 15 HP, 3/60/440 V Swing Frame.
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McCabe High Speed Double End, 2" x 24" wheels.
Ransom S B Double End 2" x 20".

HOISTS
Ingersoll Rand 4000# Type D Air Hoist, late type.
500# American LoHed.
1000# Cleveland 220/440 V.
1000# Detroit 220/440 V.
5—1000# P & H Hevi Duty with trolley.
2—2000# P & H Hevi Duty with trolley.
2000# Detroit Electric.
2000# American LoHed.
11—4000# P & H Hevi Duty with trolley.
2—4000# P & H Hevi Duty with trolley and powered drive unit for moving hot metal.

LADLE
3 Ton Whiting geared ladle. Like new.
5 Ton Whiting Mixing Ladle on wheels.

MOLDING MACHINES
2—Champion Pin Lift Pushoff, 44" x 44" x 12".
2—Champion Pin Lift Pushoffs, 46" x 46" x 12".
1—Champion Jolt Squeeze Strip Molding Machine, column type, 12" jolt cylinder 8" lift, 18" x 21" table.
1—Champion 24 Hand Clamp rollover 26" x 16" table.
1—Herman 20" x 30" Rollover Pattern draw 6" bumper.
1—Herman 4000# High Speed Rollover 30" x 60" with 32" x 48" bumper, 13" cylinder pattern device.
1—Herman 20" x 24" Jolt Rollover Pattern Draw, Like New.
1—Johnston & Jennings 218 Rollover Pattern Draw, 30" x 24" table.
1—Osborn 601-13 Portable Jolt Rollover Pattern Draw, 30" x 24" flask size, 10" draw, 900# cap.
1—Molding Unit, consisting of Osborn 23" x 24" table, Jolt squeeze and Osborne 17" x 24" 814P Rollover with overhead hopper for each machine, 1 with bottom dump, other with flat belt sand delivery.
1—Tabor, 1000# Rollover 30" x 5'. Excellent condition.

MULLERS
Simpson #1.
Simpson #2, bucket loader, motor on base plate.
Simpson #3, motor on base plate.
Simpson #3, Type H.
Clearfield #404, 5 HP 440 V motor.
Kwick Mix Paddle type portable.

ROD STRAIGHTENER
Pneumatic Guillotine Type.

ROTOCLONE
Size 24, Serial 9447 with chain type ejector, 40 HP, 3/60/220 V motor.

ROTOBLAST
Pangborn, table with 3-8" rotating work tables, 3 position loading, cleaning and touch-up designed for work similar in size to aircraft cylinders. Like New condition.

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1—3' x 5' Link Belt.
2—4' x 6' Simplicity.
1—6' x 9' Simplicity.

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TUMBLING BARRELS
Sly 30" x 60" with dust collector and reduction drive.

WHEELABRATOR
36" x 42" American 370 Cabinet Type, 15 HP main drive shot elevator.

We are now dismantling a sand preparation unit at Baltimore for sale by the piece.
21' x 24" Belt Conveyor, 5 HP Syncrogear motor drive.
46' Bucket Elevator 8" x 12" buckets, 7½ HU Syncrogear drive.
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Rotary Screen 5 HP U. S. Syncrogear Motor.
Hopper 10' x 15' x 14' deep, 3 bottom gates bolted construction.
17' x 9' Flat Belt conveyor with Magnetic Pulley.
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20" x 16' Flat belt conveyor, less motor.

ACME EQUIPMENT CO., INC.
126 South Clinton Street Phone: Andover 3-3430 Chicago 6, Illinois

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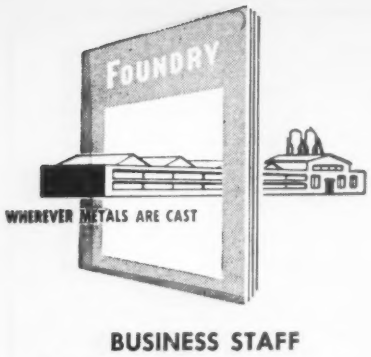

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Dear Reader:

Perspective: We have just concluded a careful reading (for the non-technical self we are) of the special foundry progress report which was a feature of our May Pre-Convention issue. We hope you have (or will) read it.

It will give you a worthwhile perspective on the dynamic and ever-growing foundry industry of which you are a part. As Frank Steinebach suggests in his introductory editorial, reaching the anticipated goals for castings production means a tremendous challenge for every company producing castings.

Ideas, news, and information made freely available to foundrymen wherever metals are cast has played an important part in the progress of this great industry—in each monthly issue of FOUNDRY we bring you over 300 pages of current knowledge which is, we hope, helpful in the solution of your many present-day problems.

—o—

Monticello: It was our pleasure to make our first visit to Thomas Jefferson's historic home recently. We were profoundly impressed with this great American's broad interests and diversified talent, much of which escaped us in our school days. The weather vane dial, an ingenious clock whose weights designate the day of the week, a dumb-waiter built into the side of a fireplace in the dining room for transporting bottled goods from the wine cellars below, the first storm windows, the layout and design of Monticello itself—and innumerable other products of his great imagination were merely the beginning of a great Ameriacn industrial system. A system of "imagineering" in which man can create almost anything he can imagine.

The question is, today, are we finding the time, taking the time to keep up with our imagining as is applied to our particular businesses and jobs?

—o—

It's new: our mailing division has recently installed a new wrapping machine. FOUNDRY will now be delivered to you in a wrapper rather than an envelope. Approximately 2,500 copies are wrapped hourly. We anticipate the issue will arrive with less tendency for corners to "bent"—and you will, of course, be saved one or two seconds in getting off to a good reading start! Mechanization of production is a time and money-saver in the publishing business, too.

(Continued on next page)

(*Continued from page* 295)

PFL: Every two years since the turn of the century, FOUNDRY has conducted an exhaustive census of the industry in the United States and Canada. For the past six months, Market Research Manager Dave Gibbs and staff assistants, Mildred Christopher, Florence Bell, and Helen Smith have been poring over questionnaires which will emerge as a composite picture of the industry as it is today. Statistical analyses for all branches of the industry will be available shortly. For the benefit of castings buyers and suppliers, names, addresses and selected information on all foundries in the United States and Canada will be published in book form, entitled, *Penton's Foundry List.*

—o—

Reprints: Several months ago, Associate Editor Bob Herrmann prepared a series of feature articles on material handling the various departments of a foundry. As a service to the industry, we have had the series reprinted and will be glad to send single copies to readers who send their requests to Jeanne Franklin of our Business Staff.

—o—

Sales Programs: We have long contemplated the idea of compiling information on foundry selling programs. There are some notable instances of foundries which have embarked upon aggressive selling programs with considerable success. As a starter, we are especially interested in having readers send us copies of booklets or other printed material which they are using for new business promotion. Tell us, if you will, how you handle your selling problems. Do you have one or more salesmen who call on prospective customers? What approaches have you found most successful? We suspect there might be considerable interest in such "case histories" and would like to discuss them for the benefit of all.

If you have been thinking about this problem yourself and would like some ideas, perhaps we can be helpful. It is our pleasure frequently to advise with suppliers on sales programs designed to sell the foundry market. We inevitably get into market research problems, advertising and promotion planning—the same problems and technics involved in selling anything. While we are not exactly prepared to function as your marketing counsel, we will be glad to give you the benefits of our thoughts and experience on the subject if you will write to us.

F. A. Rose

Business Manager

BIG SAVINGS IN PATTERN SHOP TIME AND LABOR with SCIENTIFIC Pressure Cast MATCH PLATES

YOU NEED NO MORE THAN ONE MASTER PATTERN

• FROM IT WE MAKE PRECISION MULTIPLE DUPLICATES IN ONE COMPACT MOLD.

Cast of aluminum, the plates are poured under pressure to assure filling all detail. Molding is done in plaster only, for extreme accuracy.

Expensive duplicate master patterns and high cleaning costs are eliminated.

WRITE FOR BULLETIN NO. 52

The SCIENTIFIC CAST PRODUCTS *Corp.*

1390 East 40th Street
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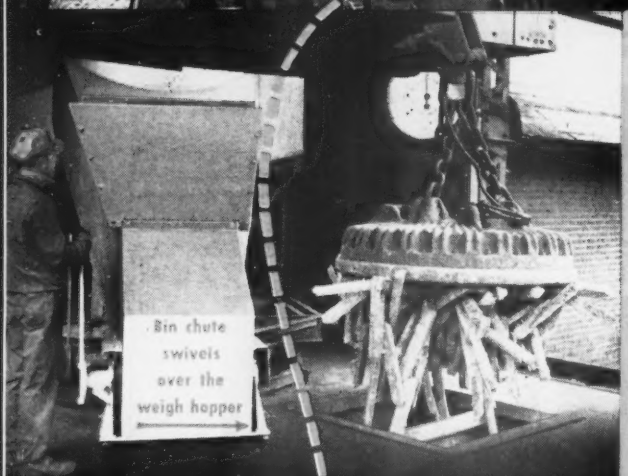
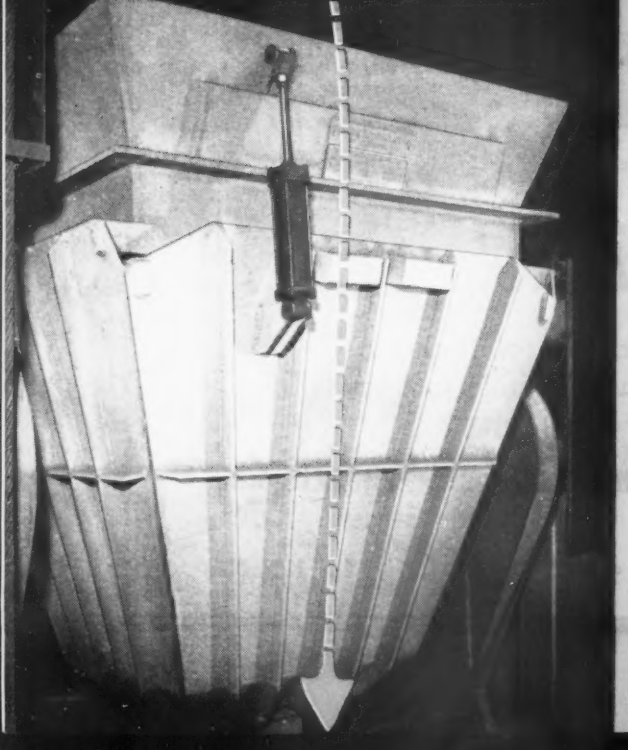


Coke and stone, unloaded by a MODERN crane and gravity fed to a MODERN weigh hopper simplifies charging through the MODERN SMALL-CONE cupola bucket.



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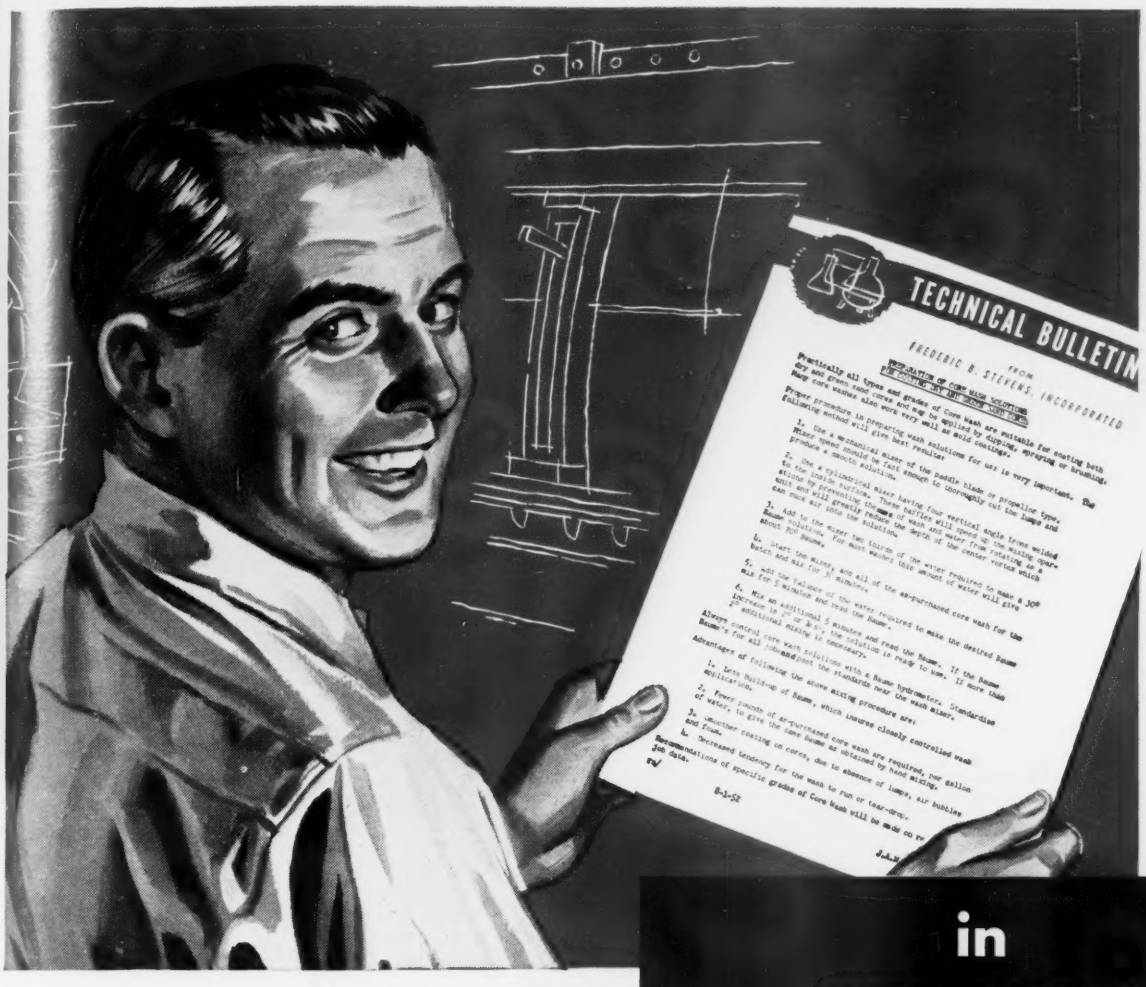

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F-105 Stevens Fastick Liquid Core Paste
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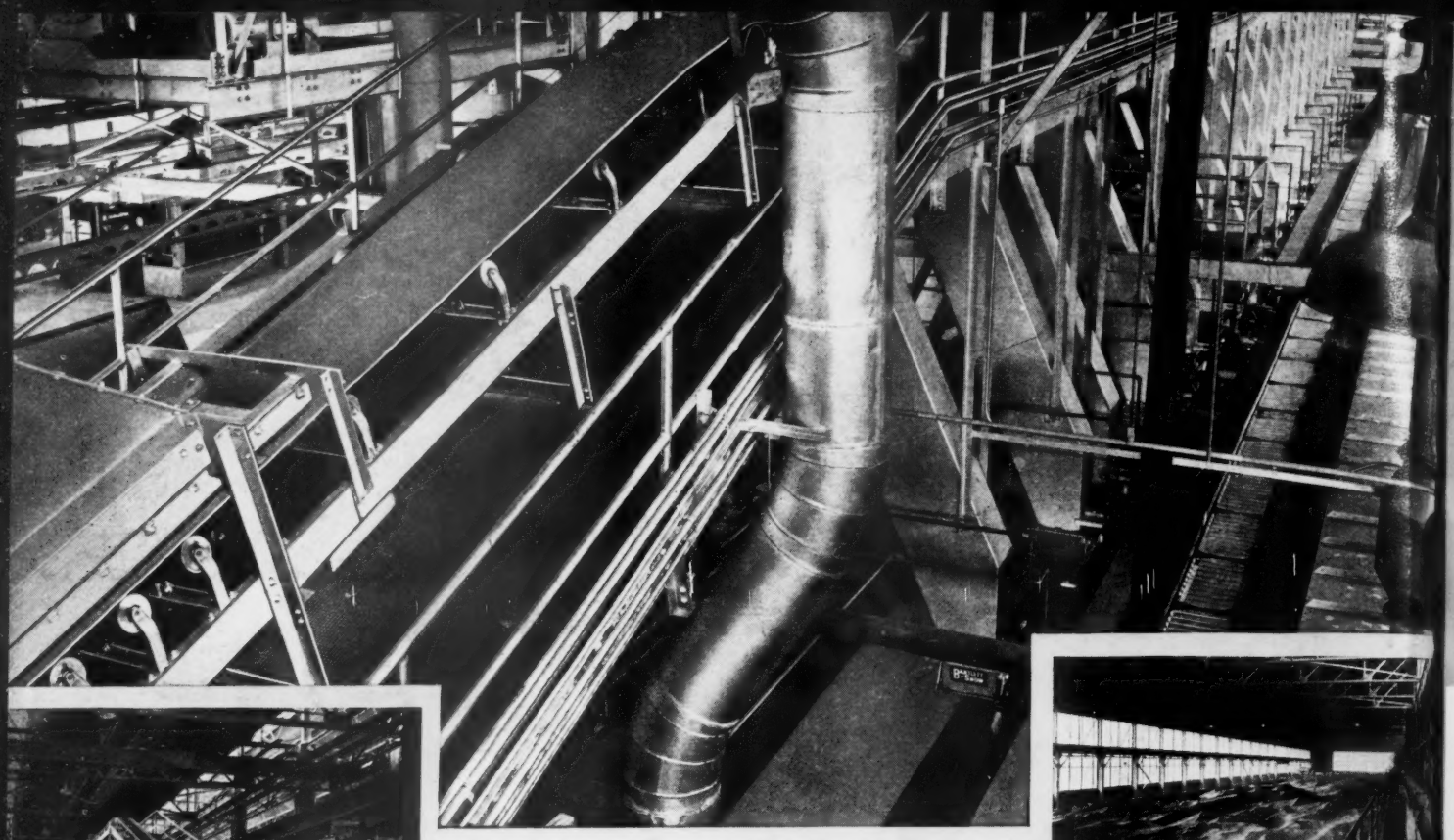
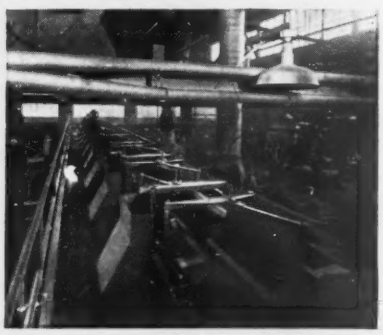


Above; View of Prepared Sand Handling and Distributing System in Large Automotive Foundry.

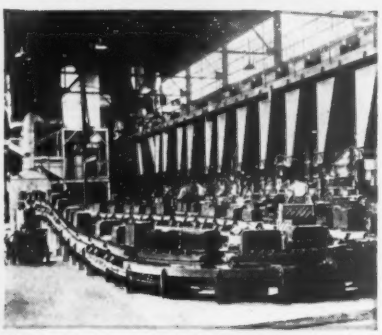
Above; View in Large Implement Foundry Showing Distributing System, Molders Hoppers and Mold Conveyor; At Right: Distributing Dried and Cooled New Sand to Bulk Storage Bin.

new prepared core shakeout and waste

Sand Handling SYSTEMS



Prepared Sand Distributing Belt Showing Adjustable Plows that Discharge Sand to Hoppers on Either Side of the Belt.



General View in Jobbing Foundry Showing Sand Distributing System, Molders Hoppers and Self Dumping Car Type Mold Conveyor.

including controlled screening, cooling, aeration and mulling;— assure unvarying uniformity day after day;— more molds per day with less effort; — better castings with less scrap; — and increased output per man and square foot of floor area.

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